HORTICULTURAL ABSTRACTS

Vol. 28, 1958

Prepared by
COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS,
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THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

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Technical Communications

Diminished stocks of T.Cs 22 and 23 [see back cover] are still available. T.C. 24 on the **Mulching of Vegetables** has been favourably reviewed and is in persistent demand.

Completion of the typescript of T.C. 25 on **Chemical Tissue Tests** is expected in the near future.

Subject matter of Horticultural Abstracts

Horticultural and plantation crops and the application of science to their cultivation.

Under **horticultural crops** are included all whose products normally appear as fruits, vegetables, nuts or flowers, while all tropical and sub-tropical perennials, other than forest trees, such as tea, rubber, oil palm, sugar cane, etc., are classed as **plantation crops**. Tobacco, drug, insecticidal, spice and certain **other plants** difficult to classify are also dealt with.

The storage and preservation of these plants are covered only in so far as they are the direct concern of the grower.

HORTICULTURAL ABSTRACTS

Vol. XXVIII March 1958 No. 1

Initialled abstracts and reviews not by Bureau staff are by R. J. Garner and R. L. Knight of the East Malling Research Station, by J. P. Hudson of the University of Nottingham, and by G. St. C. Feilden and J. R. Llewelyn.

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EDITORIAL NOTES

NOTES OR BIBLIOGRAPHIES AVAILABLE

In 1957 87 readers availed themselves of the information listed under this heading in Horticultural Abstracts, Vol. 27, No. 1 and 397 items were thus distributed.

Below are listed 40 similar stencils compiled in reply to individual enquiries. 1 copy only will be sent gratis to any one address so long as the supply lasts.

Please note that maximum use can be obtained from these files only in conjunction with the relevant volumes of Horticultural Abstracts. Thus, one of the purely bibliographical replies listed below, that to Query File 3246, consists entirely of the numbers of relevant abstracts. In all other cases titles or annotated titles of original articles are cited.

Interested readers should write direct to us [NOT to C.A.B., Farnham Royal] merely quoting the Query File No.

Query File No.	*Subject.*	*Information given.*
3122	Annotated bibliography bearing on **Time and motion or labour efficiency studies in horticulture**	39 references
3123	Bibliography on **Horseradish**	30 references
	Translation of article by Blassinsky in *Der praktische Ratgeber im Obst. u. Gartenbau*, No. 10, 1955, pp. 224 and 225 on **Growing horseradish**	2 pages translation
3124	Bibliography on **Rhubarb**	52 references
3126	Bibliography on the **Clementine, with some data on acreages, production and trade**	49 references
3128	Translation of article by de Bijl in *Fruitteelt*, 1956, **46**: 664–6 on **Experience with pears on quince rootstocks**	2½ pages

Query File No.	*Subject.*	*Information given.*
3129	Translation of article by Pavlova in *Vestnik Social Rasten*, 1940, No. 5, pp. 33–46 on **Initial material for the breeding and cultivation of bush fruits**	8 pages
3131	Notes and bibliography on **Methods of eradicating tropical forest and plantation trees, with particular reference to preventing subsequent infection of crops by *Armillaria* and other root rotting organisms**	1 page + 8 references
3132	Bibliography on **Air pollution**	79 references
3134	Bibliography on **Control of harmful birds**	35 references
3137	Annotated bibliography on **Water hyacinth *Eichhornia* spp. and its control**	96 references
3158	Bibliography on **Ginger cultivation**	34 references
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3166	Annotated bibliography on **Sawdust mulches. Pros and cons**	12 references
3170	Bibliography on the **Effect of growth substances on colour (27) and size in various fruits (124), and the life of stored citrus fruits (21)**	172 references
	Bibliography on the **Harvesting of apples, citrus, deciduous fruits, peaches and pears**	136 references
3174	Translation of article by Ulrich in *Fruits d'Outre Mer*, 1956, **11**: 239–44 on **Physical, chemical and physiological variations within fruits**	5 pages
3192	Annotated bibliography on the **Effects of saline soil and irrigation water on fruit trees and plants**	67 references
3196	Annotated bibliography on the **Use of hormones in coffee cultivation**	19 references
3198	Translation of account of methods given in article by Floor in *Meded. Inst. Vered. Tuinbouwgew.* **73**, 1956, pp. 19, on **Experiments with cuttings under mist propagation**	1 page
3200*	Notes and bibliography on **Mist propagation**	5 pages + 78 references
3202	Annotated bibliography on **Eucalyptus oils and their distillation**	18 references
3206	Translation of article by Naugoljnyh in *Bot. Žurnal*, 1955, **40**: 715–19 on **Changing the sex characters in cucumbers to increase their productivity**	6 pages
3207	Notes and bibliography on **Tulip fire, *Botrytis tulipae* Lind. (syn. *B. parasitica* Cav.) and its control**	1½ pages + 14 references
3215	Translation of Italian article by R. Gigante in *Boll. Staz. Pat. veg. Roma*, 1954, **12**: 127-36 on **Blotchy ripening of tomatoes**	3 pages
3217	Notes on the **Drying of coffee by exposure to sun, shade and chemicals. A summary of materials, methods and results**	2 pages
3219	Notes and bibliography on the **Materials and methods used in air-layering**	1 page + 29 references
3220	Annotated bibliography on the **Prevention of delayed foliation and dormancy breaking in top fruits by chemical treatment**	30 references
3223	Annotated bibliography on the **Effect of day length and temperature on flowering of gladiolus**	13 references
3224	Annotated bibliography on **Vitamins in cabbages and carrots**	13 + 23 references
3229	Notes and bibliography on the **Vegetative propagation of rubber [*Hevea brasiliensis*]** [being addendum to *Tech. Commun.* 13 of 1940]	1½ pages + 14 references
3230	Notes and bibliography on **Vegetative propagation of sapodilla (*Achras zapota*), durian (*Durio zibethinus*) and rambutan (*Nephelium lappaceum*)** being a revision of parts of *Tech. Commun.* 7 of 1936]	3 pages + 113 references

*Q.F. 2089 and 3117 revised.

Query File No.	*Subject.*	*Information given.*
3234	Annotated bibliography on **Physiological aspects of flowering and pod set in *Phaseolus* spp.**	16 references
3237	Annotated bibliography on **Labour efficiency in horticulture**	50 references
3238	Notes and bibliography on the **Cultivation of Cape gooseberry (*Physalis peruviana*) in Australia, New Zealand, S. Africa and Rhodesia. With additional references for India and Florida**	3 pages + 16 references
3242	(a) **American journals dealing with the cultivation of ornamentals** (b) **Research centres at which work on ornamentals is carried out in the U.S. and Canada**	5 pages
3243	Expansion of abstract on Portuguese article by Machado in *Bol. inf. Café Chinchiná-Caldas*, 1952, **3**(27): 39–40 and 1953, **4**(37): 23–5, 25–8, on **Experimental Project No. 10(3) of the Agronomy Section of the National Centre for Coffee Research—Chinchiná-Caldas, Colombia. Record of coffee nutrition**	4 pages
3246	**Citrus nutrition** entries in *H.A.*, Vols. 16–27(3), 1946–1957. [No titles given, only the numbers of relevant abstracts in *H.A.*]	2 pages
3264	Annotated bibliography on the **Culture of arum lily** [*Zantedeschia*]	13 references
3273	Annotated bibliography on the **Application of gibberellin to horticultural plants** [mainly taken from *H.A.*, Vols. 25–28(1)]	47 references
3274	Notes and bibliography on **Maté tea or Yerba Maté** [***Ilex paraguariensis***]	2 pages + 8 references
3282	Annotated bibliography on **Weed control in coffee**	42 references

SALIENT ITEMS, Vol. 28, No. 1.

ADVANCE ?

In abstract 485 occurs the statement that "yields per acre of tomatoes have shown no significant increase since 1943". This depressing information relates to glasshouse tomatoes grown in the U.K., and for aught we know the situation in Outer Mongolia or Upper Silesia may be very much brighter. At least there must surely be someone somewhere who has been able to turn to advantage the mass of information published in more than 2,000 papers perused by us during the same period.

ENVIRONMENT

Controlled environments:—The appearance of a book on "the experimental control of plant growth", emanating from the Earhart Laboratory at Pasadena, is likely to arouse widespread interest (980). It is a tribute to the progress made in this field that simultaneously two other books should appear which deal with the practical applications of environmental control (975, 976).

Soil and water:—Soil, rainfall and other factors responsible for variations in tree yields have been analysed for apples in California (138) and for cacao in Trinidad (846). A review of soil-moisture regime experiments (58) is supplemented by papers on the growth responses to different water regimes of lettuces (476) and tomatoes (493, 494) and by an examination of the problem of where tensiometers should be placed (509). Other papers describe irrigation experiments on citrus (776, 777, 779), the development of a method of regulating coffee irrigation (875) and the effects of irrigation on sex expression and other characters in papaws (898).

Temperature and day length:—The bean is now added to the list of plants for which night temperature is a critical factor (434). There also appear to be critical stages in growth, at which low temperatures will induce blindness in cauliflowers (415) and encourage the formation of female flowers in cucumbers (424). To make pinks flower a period of low temperature is needed, although the actual development of primordia proceeds subsequently at higher temperatures (673). With lentils the growth responses of roots to IAA may be altered by changes in temperature (436). Finally, there are "photothermographs" for use in studying the ecology of vegetable varieties (395) and, for those in search of something rather simpler, the use of night lights in gardens to produce bigger and better, but less hardy, shrubs (659).

Climatic misbehaviour:—Howling gales and protection therefrom (229–231), frost studies on citrus (773) and a "hail-suppression" service that appears to work (238).

GROWTH PHENOMENA

Growth and metabolism:—Studies described concern the patterns of growth in tomato plants (490) and oil palms (889) and the factors affecting shoot production in tea bushes (944–947). Inside apple trees there are pronounced differences in the composition of the nitrogen compounds present in the shoots, leaves and fruits in any one season (144, 153) and also as between on- and off-years (151).

Fruit set, thinning and drop:—Among papers on these subjects is one on the application of benzothiazol compounds to induce parthenocarpic fruit formation in figs (130) and two on the use of NAA to thin olives (813) and to check fruit drop in black currants (183). With apples the relationship between fruit drop and starch changes during ripening varies with the average temperature prevailing during the harvest period (153).

The inevitable gibberellins:—Another useful review is available (29). As to individual plant responses it is only possible to say here that they appear to be legion (400, 401, 438, 492, 667, 668, 690, 714, 825). In addition, attention is now being turned to the possible uses of these compounds in the control of plant diseases (30, 402, 437, 520).

MACHINERY, EQUIPMENT AND METHODS

Machines and apparatus:—General articles include one on the operation and power requirements of tractors for citrus production (780) and another on mechanical aids in the harvesting of fruits and nuts (63). A simple, bullock-drawn sugar cane planter is now available (914), as are several mobile irrigation units (736) and apparatus for injecting nutrients into irrigation pipe lines (57). There is also a platform for picking fruit (160) and a motor unit for circulating fumigants under tarpaulins placed over strawberries (301).

Spraying equipment:—A new edition of the U.K. Ministry's bulletin "Fruit tree spraying" has been issued (322). Two new sprayers (323, 324) and two new lances are described (325, 826). Investigations on the performance of mistblowers in coffee plantations are also reported (878).

Fruit, vegetable and flower containers:—There are bins for transporting apples to the packing house (161) and bulk box dumpers for unloading them (162). For peaches there are moulded pulp trays (179), for pears cartons (178), for strawberries ventilated lugs (196) and for cut flowers a variety of prepackaging films (665). The progress of fruit and vegetable prepackaging in parts of the U.S.A. is reviewed (66).

Grading, drying and storage—A low-cost tomato grader (528) and two cacao driers (862, 863) are described. The physical factors involved in the drying of grapes are considered in detail (215). One whole number of a journal is devoted to the cold storage of fruit (163), and there are also papers on the use of gamma radiation to extend storage life (42, 43).

Glass and plastic houses:—Polythene houses and other coverings are being used for various purposes (60, 74, 399). Studies suggest ways of improving both heat retention and cooling in glasshouses (61, 658).

Aerial surveys:—Not much that is happening to orchard trees appears to escape the eye of a camera supplied with infrared-sensitive films (65).

NUTRITION

Absorption by leaves and roots:—A study on swedes shows that leaf sprays of P may depress P uptake by the roots under some conditions but not others (473). Similarly a study on excised cacao roots shows that the amount of P absorbed varies with the P status of the plant (848). Experiments on Zn-deficient tomatoes suggest that soil applications would give the best results at transplanting and spray applications once the plants are established (508). With papaws the proximity of the sea may increase Na uptake twenty-fold (404).

Major elements:—There is evidence that with apples K may reduce twig diameter and P increase leaf size (132). With peaches fruit thinning may increase the K content of the leaves (150). In tomato plants respiration and carbohydrate metabolism are influenced by K (507). In *Datura* plants alkaloid formation is affected by all the major elements (596) and in other plants flower formation is similarly affected (44).

Chelated minor elements:—A symposium on "Chelates in plant nutrition" is covered by 5 abstracts (47, 48, 226, 440, 771). Among other papers are two dealing with the control of lime-induced chlorosis (223, 757).

Non-chelated minor elements:—Another symposium, this time on "Trace elements in soils, plants and animals" (46). Minor elements from different sources, e.g. frits and granular types, differ in their effects and toxicity (499, 722). Boron affects the uptake of Ca and K by apple trees (221) and cell division, growth and seed yield in legumes (49). Deficiency of copper appears to upset the water relations of azaleas (734). Iron is shown to have a number of effects on plant development and metabolism (50, 51, 441, 455, 456), and it also interacts with applied 2,4-D (504). The leaves of virus-infected cherries contain less Fe and Mn than the leaves of healthy trees (248).

PLANT PROTECTION

Plant resistance to diseases:—The resistance of plants to invasion by fungi is associated in various ways with polyphenolic compounds and the activity of oxidizing enzymes (260, 266, 428, 467, 692) and also apparently with osmotic pressure (478). Some plant waxes possess fungistatic properties (257), and plants may also produce their own antibiotics either in response to invasion (256) or possibly through the agency of mycorrhizal fungi (253).

Plant responses to sprays:—With apples fruit set, size and storage quality may be affected by the spray programme (326–328), and in strawberries chemical composition may be affected by certain fungicides (276).

Fungi and bacteria:—*Pythium* species, usually regarded with disfavour (228), may sometimes possess good points (119). Another unpopular soil organism, *Verticillium albo-atrum*, may be destroyed by burial, assuming you can lay hands on a large enough plough (610). For controlling decay of citrus fruits ammonia gas is either (a) most valuable (798, 799) or (b) almost valueless (800). Seekers after records of really complex rot complexes may care to glance at abstract 258, and collectors of new antibiotics at abstract 406.

Viruses:—As though there were not already enough ways of transmitting fruit tree viruses, pollen must be added to the list of carriers (241). With stone fruits it is possible to raise plants free from ringspot by heat treatment, provided budwood is then taken quickly before the virus has had time to reinvade the young shoots (242). Heat treatment can also be used to destroy some, but not all, of the numerous viruses afflicting chrysanthemums (684, 685). Chemical inactivators are to be found in 514 and, as usual, in the Tobacco section (570 *et seq.*).

Insects:—The growth of sugar cane is depressed by the body fluid of mealybugs and also by a yeast associated with the insects (939). In the control of codling moth temperature and relative humidity may affect the toxicity of some insecticides but not others (309).

Nematodes:—The hope that organic matter might help to suppress citrus nematodes appears to be fading (796). For the treatment of growing plants it is therefore still necessary to rely on chemicals such as Nemagon (293–295) and perhaps PRD (525).

PROPAGATION

General:—There are two general manuals on plant propagation (652, 967) and one which describes in detail the method of producing container-grown plants developed by the University of California (963).

Seeds:—A new electrostatic method of separating crop from weed seeds is mentioned (39). Seed dormancy and methods of overcoming it continue to receive attention (544, 694, 706), as does treatment with fungicides and insecticides (444, 449, 450) and with ultrasonic waves (396). With lettuces blue light at first inhibits and then stimulates germination (475). With citrus the appearance of albino seedlings can be prevented by removing the seed coat (761).

Cuttings:—For general information there is a bulletin from Massachusetts (36), and for information on several aspects of mist propagation there are four papers (34, 35, 95, 655). Descriptions are also given of the polythene sheet method of rooting cacao cuttings (844), of a rapid method of raising deciduous fruit trees from root cuttings (94), and of the use of "juvenile" grafts to improve the rooting of mature avocado cuttings (755). Among factors that affect rooting the source of cuttings is important (96), and so is the moisture content of the rooting medium (653, 654). Flower initiation and flowering and seasonal variations in the content of growth-promoting substances also affect rooting capacity (24, 727, 751).

Stock-scion relations:—Various aspects of incompatibility between stock and scion are described for apples (93), pears on quince (100–102), cherries (106), cucurbits (425) and citrus (766). The search for disease-resistant rootstocks for tomatoes and related plants continues (487, 488). Vegetative hybridization, thought to be dead, is represented by two curious examples (115, 621).

MISCELLANEOUS

Aquatic weeds:—Herbicides scattered on ice (345).

Artificial resin foam:—For soilless culture (657).

Chemical thinning:—Compared with mechanical thinning for vegetables (397).

Economics:—Economics of intensive horticultural production in Britain (59) and work studies on vegetables and chicory (393, 592).

Paternal influence:—Varies in apples with the age of flowers at the time of pollination (124).

Soil aeration:—Reduced by grass cover crops (820).

Sombre view:—Fields covered with black polythene mulches (192, 193, 219a, 398, 756).

MISCELLANEOUS.

General.

(*See also* 68j, s, t, 962, 964, 968, 980, and Notes on Annuals and Reports.)

1. NAZAROV, I. E. (editor), AND OTHERS.
[Forty years of Soviet horticulture.]
Sad i Ogorod, 1957, No. 10, pp. 5-94, illus.

In celebration of the 40th anniversary of the October revolution, this number of "Orchard and Garden" is devoted to review articles on achievements in fruit, vegetable and vine growing in the Soviet Union as a whole and in the various republics, in the field of science and on the collective and state farms.

2. PREVOT, P.
Conférence internationale sur l'utilisation des radio-isotopes dans la recherche scientifique, Paris, 9-20 septembre 1957. **(International conference on the use of radioactive isotopes in scientific research, Paris, 9-20 September, 1957.)**
Oléagineux, 1957, **12**: 665-7, bibl. 14, illus.

Examples briefly quoted concern studies of photosynthesis, tissue culture, biosyntheses in roots, translocation, foliar diagnosis and factors affecting its accuracy, and interaction of nutrient elements.

Statistical methods.

(*See also* 68p. 182, 204, 219d.)

3. SCOSSIROLI, R. E., AND SCARASCIA, G. T.
Applicazioni della statistica in agricoltura. **(Applications of statistics to agriculture.)** [English summary 5 lines.]
Tabacco, 1957, **61**: 50-83.

Measures of variability are discussed and calculations are explained including comparison of differences by the *t* test, using data from tobacco plants.

4. FREEMAN, G. H.
Some further methods of constructing regular group divisible incomplete block designs.
Reprinted from *Ann. math. Statist.*, 1957, **28**: 479-87, bibl. 3.

Some further methods are given for the construction of regular group divisible incomplete block designs, and designs derivable by these methods are tabulated. The methods are (i) designs containing complete and incomplete groups; (ii) designs with groups arranged in sets; and (iii) designs derivable by addition. In the first two of these methods, which are related, it may be possible to avoid having to take all the blocks that the full procedure would indicate. [Author's summary.]—E. Malling Res. Stat.

5. PEARCE, S. C., AND HOLLAND, D. A.
Randomized branch sampling for estimating fruit number.
Biometrics, 1957, **13**: 127-30, bibl. 5.

The method of randomized branch sampling described by Jessen [*H.A.*, 25: 3421] is examined and compared with some alternatives, notably the long-established method described by Hoblyn [*Bur. T.C.* 2, 1931].—E. Malling Res. Stat.

6. KEMPTHORNE, O.
Arrangements of pots in greenhouse experiments.
Biometrics, 1957, **13**: 235-7, bibl. 1.

The author, in replying to a query, expresses the opinion that the validity of an experiment would not be affected by rearranging the pots within replications, or by re-locating whole replicates at regular intervals. Although in theory such rearrangements might reduce the error variance due to location, no experimental work appears to have been done to determine whether the procedure would appreciably increase efficiency.—Ia. St. Coll., Ames.

7. OWEN, P. C.
Rapid estimation of the areas of the leaves of crop plants.
Nature, 1957, **180**: 611, bibl. 1, illus.

The method described by Freeman and Bolas [see *H.A.*, 26: 2401] for determining leaf area has been modified for use on leaves which are not elliptical, and a satisfactory grid has been constructed for sugar beet leaves. Further modification is possible for any leaves for which there exists a convenient pair of dimensions linearly related to area, and in which the leaf shape is either independent of size or changes regularly with size. This method is likely to be more accurate than the rating methods at present used when leaf areas must be estimated without destroying the leaves.—Rothamsted exp. Stat., Harpenden.

Climate and air pollution.

(*See also* 68q, 705, 731, 753s.)

8. WINTER, E. J., AND STANHILL, G.
Horticultural climatology at the National Vegetable Research Station.
Weather, 1957, **12**: 218-22, bibl. 10, illus.

The crop weather station established at Wellesbourne in 1950 makes all the observations commonly made at such stations and in addition uses special equipment for studying various aspects of evaporation and transpiration. The equipment used and its lay-out are briefly described, and some of the applications of the data obtained to studies in progress on water balance and plant growth are discussed.

9. BLEASDALE, J. K. A.
Smoke pollution and the growth of plants.
Herb. Abstr., 1957, **27**: 161-5, bibl. 48.

A review article briefly citing literature on the following: Coal smoke pollution factors; effects of pollution on light, soil and plant growth; effects of the gaseous constituents of pollution. There is extremely little specifically applicable to horticultural crops.

10. FREEBAIRN, H. T.
Reversal of inhibitory effects of ozone on oxygen uptake of mitochondria.
Science, 1957, **126**: 303-4, bibl. 12.

Earlier work [see *H.A.*, 26: 1008, 27: 839n] suggested that an understanding of the effects of ozone on mitochondria could be important for the prevention and control of air pollution damage. Experimental results suggested that the inhibitory effects of small amounts of ozone on cabbage and spinach mitochondrial respiration were reversed by ascorbic acid, reduced glutathione and ozone-affected enzymes that were associated with the mitochondrial citric-acid-cycle activity.—Univ. Calif. Citrus Exp. Stat., Riverside.

Biochemistry.

(*See also* 68c, m.)

11. Bukatsch, F., and Wildner, G.
Ascorbinsäurebestimmung in Nektar, Pollen, Blütenteilen und Elaiosomen mit Hilfe einer neuen Mikromethode. **(Ascorbic acid determination in nectar, pollen, flower parts and elaiosomes by means of a new micromethod.)** [Spanish summary ⅓ p.]
Phyton, 1956, 7: 37-46, bibl. 15, illus.

By means of a new method combining spot analysis with paper chromatography it was found possible to determine 0·2 γ ascorbic acid in a drop of 0·001 ml. The results obtained from analyses of nectar, pollen, flower parts and elaiosomes of various plants are tabulated. Members of families rich in ascorbic acid differed considerably in the vitamin C content of their nectar; in Ranunculaceae, Labiatae and Onagraceae, for instance, it varied between 0 and 80 mg. %. Nectar of *Gladiolus* was very low in vitamin C, whereas that of *Lilium longiflorum* exceeded 100 mg. %. The ascorbic acid content of the pollen was not always related to that of the nectar. All samples of elaiosomes analysed contained some ascorbic acid, ranging from 20 to 00 mg. %.

12. Crocomo, O. J., and Salibe, A. A.
Estudos sôbre a vitamina C. I. Carvão animal e vitamina C. II. Vitamina C em alguns produtos vegetais. **(Studies on vitamin C. I. Animal charcoal and vitamin C. II. Vitamin C in some plant products.)** [English summary ⅓ p.]
Rev. Agric. Piracicaba, 1957, **32**: 91-8, bibl. 8.

Vitamin C contents are tabulated for fruits and leaves of *Myrciaria glomerata*, fruits of *Eugenia uvalha*, leaves of vine, globe artichoke and carrot, radish [roots?], bean leaves and pods, and leaves of onion, spinach, cabbage, endive, chicory and purslane. *M. glomerata* contained as much as 1,221 mg. per 100 g. of leaf and 3,802 mg. per 100 g. of fruit pulp.

13. Andreeva, T. F., and Nal'borčik, Ė. Ja.
The composition of photosynthetic products as affected by the physiological condition of the plant and certain external factors. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1957, **114**: 662-5, bibl. 14.

Results are given of various laboratory experiments, using C^{14} and N^{15}, on plants which included bean and *Nicotiana rustica*. It is concluded that during natural conditions of growth amino acids and protein are formed in the leaves during the process of photosynthesis. The quantitative ratio of the photosynthetic products (carbohydrates, proteins, amino acids, organic acids) varies according to species, age, physiological condition and external influences. The proportion of protein in the photosynthetic products is small, amounting to about 1·5–4%. Amino acids form a larger part of the nitrogenous photosynthetic products; their quantity (20–30%) varies more than that of the proteins according to physiological condition.

14. Bollard, E. G.
Translocation of organic nitrogen in the xylem.
Aust. J. biol. Sci., 1957, **10**: 292-301, bibl. 16.

Determinations of the nitrogenous compounds present in the xylem sap from a range of dicotyledons, monocotyledons, and gymnosperms [including many fruit and ornamental plants]. Nitrate nitrogen was present in the sap from a few species in appreciable amounts, but in most cases was either absent or present as a trace only. All saps contained a range of amino acids and amides, glutamine and asparagine were quantitatively the most important compounds, and some saps contained either citrulline or allantoic acid as a major constituent. [Author's summary. See also *H.A.*, 27: 11.]

15. Doman, N. G.
The participation of photobiochemical reactions in the reduction of sulphates by the green leaves of plants. [Russian, with English summary 6 lines.]
Biohimija, 1957, **22**: 715-24, bibl. 20, illus.

It has been demonstrated by means of labelled S that light facilitates the reduction of sulphates in bean leaves, both in the presence and absence of CO_2, and the accumulation therein of protein sulphur. No correlation was noted between the protein sulphur and sugar contents. A possible scheme governing the sulphate reduction mechanism in the plant is suggested.

16. Gerola, F. M., and Barbesino, M.
Modificazioni dell'attività deidrogenasica dei tessuti cambio-liberiani dei rami, in conseguenza di anellazioni. **(Changes in dehydrogenase activity of cambium and phloem tissues resulting from ringing.)** [English summary ⅓ p.]
Nuovo G. bot. ital., 1956, **63**: 186-93, bibl. 11.

In ringed branches of *Forsythia viridissima*, *Populus italica*, *Prunus avium* and *Corylus avellana* the normal apex-base gradient of dehydrogenase activity was interrupted and two gradients were established with maxima immediately above and below the ring. [For earlier work see *H.A.*, 27: 2133.]

Physiology.

(*See also* 68h, 661, 975.)

17. Zeevaart, J. A. D.
Studies on flowering by means of grafting. I. Photoperiodic induction as an irreversible phenomenon in *Perilla*.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1957, **60**: 324-31, bibl. 7.

Photo-induced leaves of *Perilla crispa* were grafted onto *Perilla* plants growing in long-day conditions. The leaves induced a flowering response in these stocks so long as the leaves remained in a good physiological condition. Leaves kept for 3 weeks under short day conditions, followed by 4 weeks under long day conditions, were still able to induce flowering in long-day stocks. It is concluded that photoperiodic induction in *Perilla* is an irreversible phenomenon.—Lab. Tuinbouwpl., Wageningen.

18. ZEEVAART, J. A. D.
Studies on flowering by means of grafting. II. Photoperiodic treatment of detached *Perilla* and *Xanthium* leaves.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1957, **60**: 332-7, bibl. 8.

Detached *Perilla* leaves and leaves on cuttings with or without axillary buds were induced by short-day treatment. The detached and induced leaves were grafted on a stock kept under long-day conditions and were able to induce flowering in it. In *Xanthium* only leaves in organic connection with an apical shoot meristem during induction were able to induce long-day stocks to flower.—Lab. Tuinbouwpl., Wageningen.

19. DE ZEEUW, D.
Flowering of *Xanthium* under long-day conditions.
Nature, 1957, **180**: 558, bibl. 3.

Previous attempts to induce flowering in the short-day plant *Xanthium pennsylvanicum* under long-day conditions have consistently failed. Giving low light intensity during a 16-hr. photoperiod did not result in flowering. Low light intensity during the short (8-hr.) photoperiod delayed flowering considerably as a result, not of postponed induction, but of slower development of the flower primordia. This indicates that flowering is only possible when a large amount of energy is available. In a further experiment to determine whether long nights are necessary for flowering, it was found that flowering could be induced under short (8-hr.) dark conditions provided that cold treatment at 4° C. was applied during half of the long light period. Flower initiation was induced by low temperature treatment either before or after the dark period, but the response was greatest when it immediately followed the dark period. Low temperature treatment was much more effective when it was applied for 4 than for 2 days.—Lab. TuinbPl. LandbHogesch., Wageningen.

20. CARR, D. J.
On the nature of photoperiodic induction. IV. Preliminary experiments on the effect of light following the inductive long dark period in *Xanthium pennsylvanicum*.
Physiol. Plant., 1957, **10**: 249-65, bibl. 36, illus.

Experiments with *Xanthium pennsylvanicum* have shown that the transport of the product of the inductive dark period out of the leaf during a period of 13 hours following the dark period is influenced by light intensity. The depressing effect of the absence of light may be overcome by foliar application of sucrose. It is suggested that the product of the inductive dark period moves in mass flow with the stream of assimilates, which may be supplied by photosynthesis or by immersing the leaf in sucrose solution. [For part III see *H.A.*, 26: 117g.]—Univ. Melbourne.

21. THEIN, M. M.
Survey of anatomical and microchemical changes in the shoot of *Xanthium pennsylvanicum* in relation to photoperiodism.
Amer. J. Bot., 1957, **44**: 514-22, bibl. 20, illus.

Test seedlings, 2 weeks old, were submitted to 9- and controls to 18-hr days. Short-day treatment increased dehydrogenase activity in stem apices and induced almost full development of florets in 10 days. Differences in stem anatomy were apparent in the first week of induction. After 3 weeks the cambial zone was wider at all stem levels in the control than in the induced plants, which showed dehydration of pith, enhanced lignification of vascular tissue and, during the third week, marked reduction of tannin and fat content.—Univ. Rangoon, Burma.

22. CURRY, G. M., AND WASSINK, E. C.
Photoperiodic and formative effects of various wavelength regions in *Hyoscyamus niger* as influenced by gibberellic acid.
Meded. Landb. Hoogesch., Wageningen, 1956, **56**(14): 1-8, bibl. 10, illus.

When grown in narrowly defined spectral regions under long-day conditions, *Hyoscyamus niger* (annual strain) flowers in blue or infra-red+red radiation, whereas neither stem elongation nor flower bud formation occur in green or red light. With the addition of gibberellic acid to these treatments, the rate of the flowering process is increased somewhat in the blue and infra-red+red, and stem elongation and flower-bud formation occur in the green and red. Under short-day conditions in daylight plants which would normally remain vegetative responded in a similar manner. Stem elongation and flower bud formation were always found closely associated. [Authors' summary.]—Lab. Pl. physiol. Res., Wageningen.

23. DOWNS, R. J., HENDRICKS, S. B., AND BORTHWICK, H. A.
Photoreversible control of elongation of Pinto beans and other plants under normal conditions of growth.
Bot. Gaz., 1957, **118**: 199-208, bibl. 14.

Internodes of young Pinto bean seedlings, grown under fluorescent light, elongated to about 3 or more times their normal length in response to low radiant energies of unfiltered incandescent-filament light applied at the close of daily high-energy fluorescent-light periods. The lengthening response was due to the far-red radiant energy of the supplemental light and was completely and repeatedly reversible with red irradiation. A similar response was observed with several other bean varieties, with sunflower and with 2 species of ornamental morning-glory.—ARS, USDA, Beltsville, Md.

24. SELIM, H. H. A.
The effect of flowering on adventitious root-formation. [Dutch summary 1 p.]
Meded. LandbHoogesch. Wageningen, 1956, **56**(6): 1-38, bibl. 94, illus.

In experiments with tomato, a day-neutral plant, flower development had no effect on rooting. Flower initiation in *Perilla crispa* (a short-day plant) inhibited rooting, and flower development had an even more inhibiting effect. Rooting was also inhibited in red clover, a long-day plant, by flower initiation.—Lab. Tuinbouwpl., Wageningen.

25. MILTHORPE, F. L., AND SPENCER, E. J.
Experimental studies of the factors controlling transpiration. III. The interrelations between transpiration rate, stomatal movement, and leaf-water content.
J. exp. Bot., 1957, **8**: 413-37, bibl. 34.

In single leaves of *Pelargonium* the transpiration rate was influenced greatly by stomatal movement, but scarcely at all by water content. There was some evidence of slower transpiration during and after recovery than before wilting. After wilting the stomata increased their tendency to close in dry moving air, even after the leaf had regained turgidity. [For parts I and II see *H.A.*, 20: 1237-8.]—Imp. Coll. Sci. Technol., London.

26. JONES, R. L.
The effect of surface wetting on the transpiration of leaves.
Physiol. Plant., 1957, **10**: 281-8, bibl. 2.

The stomata of wetted leaves of *Salvia* sp. were shown to close at a higher moisture content within the leaf than those of dry leaves.—D.S.I.R., Lower Hutt, N.Z.

27. GREENHAM, C. G., AND DADAY, H.
Electrical determination of cold hardiness in *Trifolium repens* L. and *Medicago sativa* L.
Nature, 1957, **180**: 541-3, bibl. 8.

A method has been developed for measuring total injury resulting from a given cold treatment: The tissue under test is impaled on two needle tips, and the electric resistance of the tissue is then measured at 1 kc./s. (R_{LF}) and at 1 Mc./s. (R_{HF}). The electrical resistance index $R_{LF}/R_{HL}\times 100$ is taken as the criterion for injury.—C.S.I.R.O., Div. Plant Ind., Canberra.

Growth substances.

(*See also* 22, 68 b, e, u, 126-130, 183, 213, Weeds and weed control section, 400-402, 437, 438, 492, 514, 520, 521, 667, 668, 683, 690, 714, 720, 762, 849, 850, 871, 928, 929.)

28. LOCKHART, J. A., AND WEINTRAUB, R. L.
Influence of 2,4-dichlorophenoxyacetic acid on auxin content of bean seedlings.
Amer. J. Bot., 1957, **44**: 424-8, bibl. 12, illus.

Treatment with 2,4-D decreases markedly the free auxin content of the terminal shoots of bean plants, as measured by the *Avena* assay. The ether-extractable auxin decreases within 24 hr. after treatment and recovers in about 7 days. The decrease is apparent on both a concentration and absolute basis. The decrease in auxin content precedes the decrease in growth rate. [Authors' summary.]—Calif. Inst. Technol., Pasadena, and Fort Detrick, Frederick, Md.

29. PLANT PROTECTION LTD.
Gibberellic acid.
[*Publ.*] *Plant Protection Ltd., Fernhurst Res. Stat., Haslemere, Surrey*, 1957, pp. 35, bibl. 47.

In this booklet information on gibberellic acid, extracted from the literature, has been brought together in concise form under the following headings: history of discovery and development; physical and chemical properties; rates of application; methods of application; biological and physiological properties; suggested experimental uses (on various horticultural and plantation crops); experimental results (on herbaceous flower crops, shrubs, trees, vegetables, agricultural crops, fruit and turf); toxicology; availability; references (an indexed bibliography of 330 items is available on request); index of crop plants.

30. MARAMOROSCH, K.
Reversal of virus-caused stunting in plants by gibberellic acid.
Science, 1957, **126**: 651-2, bibl. 4, illus., and abstr. in *Phytopathology*, 1957, **47**: 528.

Three applications, a week apart, of gibberellic acid at 100 p.p.m. to China aster, maize and clover plants severely affected by stunting viruses increased their growth markedly but did not eliminate other signs of virus infection. Leafhopper vectors recovered the three viruses as readily from the treated plants as from untreated controls.—Rockefeller Inst. med. Res., N.Y.

31. SCHROEDER, C. A., AND SPECTOR, C.
Effect of gibberellic acid and indoleacetic acid on growth of excised fruit tissue.
Science, 1957, **126**: 701-2, bibl. 5, illus.

Tissue culture experiments showed that both gibberellic acid and indoleacetic acid stimulated callus formation in excised citron mesocarp tissue. In the presence of exogenous IAA the response to gibberellic acid was greater and extended over a wider range of concentration.—Univ. Calif., Los Angeles.

Tissue tests.

(*See also* 710.)

32. DÉMÉTRIADÈS, S. D.
Note préliminaire sur la culture *in vitro* des tissus de citronnier. **(Preliminary note on *in vitro* culture of lemon tissues.)**
Ann. Inst. phytopath. Benaki, 1954, **8**: 103-4, bibl. 3 [received 1957].

Young decorticated stem fragments 1-2 cm. long formed callus at the exposed end when cultured vertically and at both ends when fixed horizontally, the basal end being more active than the apical.

33. STEEVES, T. A., GABRIEL, H. P., AND STEEVES, M. W.
Growth in sterile culture of excised leaves of flowering plants.
Science, 1957, **126**: 350-1, bibl. 5, illus.

Inner leaves from apical buds of sunflower and tobacco have been successfully cultured and grown to maturity on both a simple and a complex medium. There was a tendency on both media for mature leaves to be chlorotic; this was partially corrected in the simple medium by including an ammonium salt.—Harvard Univ., Mass.

Propagation and seeds.

(*See also* 68a, 86, 95, 96, 185, 186, 203, 396, 450, 475, 479, 652-655, 724-727, 733, 755, 963, 967.)

34. Floor, J.
De apparatuur voor het stekken onder waterverneveling. **(Equipment for mist propagation.)** [English summary 4 lines.]
Meded. Dir. Tuinb., 1957, **20**: 685-9, bibl. 5, illus.

Equipment for mist propagation is described including a deflection type nozzle and automatic control by time-clock and thermostat, both of which have been developed by the author. [See *H.A.*, 27: 726.]—Inst. Vered. Tuinbouwgew., Wageningen.

35. Sweet, D. V.
Histological changes and nutrient losses from plant foliage under mist propagation.
Diss. Abstr., 1957, **17**: 1182, being *Publ.* 20,087 of 86 pp.

The effect of mist treatment on the leaching of root and non-root absorbed radioactive P, K and Rb from leaves was studied to determine the nutrient losses from cuttings under mist propagation. Cranberry beans which had absorbed P^{32} through their root systems were not leached of the tracer under water mist. Root and non-root K^{42} was recovered in greater quantities in the leachate of Cranberry beans and *Euphorbia pulcherrima* (var. Albert Ecke) when absorption had occurred in the dark before mist treatment. Leaching of root-absorbed Rb^{86} from Cranberry beans, when different environmental conditions were given before misting, was highest after absorption of Rb^{86} at full nutrient levels in the dark. Histological changes were observed between misted and non-misted cross sections of leaves and stems of Cranberry bean, Malling IX apple rootstock and *Prunus mahaleb* (clone 3-16). An absence of reserve food in the palisade layers of the leaf sections was accompanied by early maturation and accumulation of carbohydrate products in the stem tissues of misted plants as compared with non-misted plants of the same physiological age.—Mich. St. Univ.

36. Doran, W. L.
Propagation of woody plants by cuttings.
Bull. Mass. agric. Exp. Stat. **491**, 1957, pp. 99, bibl. 249.

This publication is a much extended revision of *Bulletin* **382**. A short introductory section dealing with the making of cuttings, factors affecting rooting, and treatment and care of cuttings is followed by a summary of published results obtained with nearly 500 species of woody plants, listed in alphabetical order.

37. Homès, J.
Une amélioration dans la technique du greffage. **(An improvement in grafting technique.)** [Flemish summary $\frac{1}{3}$ p.]
Bull. agric. Congo belge, 1957, **48**: 883-7, illus.

The method, originally designed for splice grafting of very young cotton seedlings, necessitates the use of a grooved wooden block into which is pivoted a razor blade working in a slot at an angle of about 20° to the groove. The graft is bound with a strip of self-adhesive crepe rubber.

38. Clark, B. E., Kirk, E. W., and Hofer, A. W.
The quality and labeling of seeds on sale in New York as revealed by tests completed in 1956.
Bull. N.Y. St. agric. Exp. Stat. **778**, 1957, pp. 75.

Data are tabulated on the general quality of seeds, on completeness and accuracy of labelling and on fitness for sowing of 4,317 samples from seeds offered for retail sale in N.Y. state. The samples included vegetable seeds, flower seeds, lawn-seeding mixtures and turf seeds, grain and dry bean seeds and forage crop seeds. There is an appendix on tests of various legume inoculants. [For an earlier report see *H.A.*, 26: 77.]

39. Still, T. W., and others.
Research tests new principle in seed separation.
Miss. Fm Res., 1956, **19**(12): 1, 7.

The principles are outlined of electrostatic separation of crop from weed seeds. Good results are reported for agricultural crop seeds.

40. Wareing, P. F., and Foda, H. A.
Growth inhibitors and dormancy in *Xanthium* seed.
Physiol. Plant., 1957, **10**: 266-80, bibl. 16.

Both upper and lower seeds in the burr of *Xanthium pennsylvanicum* were found to contain 2 water-soluble, fluorescent growth inhibitors. These were rapidly leached from naked embryos, but not from intact seeds. Dormant unleached embryos of upper seeds germinated when maintained in high oxygen tensions. The lower seeds, which are dormant immediately after harvesting, gradually emerge from dormancy during a period of dry storage. It is suggested that the drying of the seeds may result in increased permeability of the testa and tissues of the embryo to oxygen, and may thus bring about breakdown of the inhibitors. [For an earlier account see *H.A.*, 27: 37.]—Univ. Manchester.

Irradiation.

(*See also* 562, 659, 660, 669, 681, 688, 707.)

41. The Quarterly Review of Biology.
Symposium on the effects of ionizing radiation on plants.
Quart. Rev. Biol., 1957, Vol. **32**, No. 1, pp. 1-56.

The following papers, published here, were presented at the symposium of the American Institute of Biological Sciences: The effects of ionizing radiation on plants: biochemical and physiological aspects, by S. A. Gordon. The effect of ionizing radiation on chromosomes, by K. Sax. Genetic effects of radiation on higher plants, by C. F. Konzak. The effects of ionizing radiation on plants: morphological effects, by J. E. Gunckel.

42. Cook, H. T. (Beraha, L., and Ramsey, G. B.).
Increasing market life by atomic radiation.
Agric. Mktg, 1957, **2**(3): 3.

In several fruits and in onions dosages of gamma radiation which gave complete control of moulds and rots had an adverse effect on the host. In strawberries grey mould and *Rhizopus* rot were significantly retarded by radiation, and storage life was almost doubled by radiation combined with cold storage. Radiation reduced blue mould development in stored Jonathan apples without affecting internal core breakdown, colour or flesh texture. Although blue mould development in citrus was inhibited by radiation, the fruits became more susceptible to black rot infection. [See also *H.A.*, 27: 2283 and 2809.]

43. McArdle, F. J., and Nehemias, J. V.
Effects of gamma radiation on the pectic constituents of fruits and vegetables.
Food Tech., 1956, **10**: 599-601, from abstr. in *Quart. Bull. Mich. agric. Exp. Stat.*, 1957, **39**: 709.

A relationship is indicated between radiation-induced softening of apple and carrot tissues and the transformation of pectic substances which occurs when these plant materials are irradiated. J.R.L.

Nutrition.

(*See also* 68i, r, v, w, 439, 440.)

44. El Hinnawy, E. I.
Some aspects of mineral nutrition and flowering. [Dutch summary ¾ p.]
Meded. LandbHoogesch. Wageningen, 1956, **56**(9): 1-51, bibl. 118, illus.

Three long-day and 2 short-day plants were grown in water and vermiculite cultures in photoperiods conducive to flowering. Results with mustard were more marked in the vermiculite medium than in water culture. Flowering was earlier in mustard when N was deficient or at low levels than at higher N levels. Flowering was delayed by solutions deficient in P, K, Ca or S. These mineral deficiencies also retarded floral initiation and development and reduced inflorescence number in dill. Normal and excess N levels accelerated flower initiation and development, and produced large numbers of inflorescences in dill plants. Deficiencies of N or P had the greatest effect in retarding initiation, development and number of flower buds in *Perilla*. Nitrogen level had only a slight effect on the flowering responses of spinach; flower bud initiation was delayed for a few days when N was deficient. High N levels accelerated flower bud initiation and development in *Kalanchoë* and a large number of flowers were produced. It is concluded that the effect of minerals on the flowering process of long-day and short-day plants is indirect through their effect on the synthesis of material to build up both flower buds and auxin.—Lab. Tuinbouwpl. Wageningen.

45. Sosa-Bourdouil, C., and Lecat, P.
Remarques sur les premières phases de la pénétration des phosphates marqués par le limbe foliaire. (**Notes on the first stages in leaf penetration by labelled phosphorus.**)
C.R. Acad. Agric. Fr., 1957, **43**: 527-32, bibl. 3.

The capacity of leaves of several species for absorbing radioactive P has been calculated and compared. There were considerable differences between uptake of the various species. In May young ivy leaves absorbed about twice as much P in relation to dry weight as did old leaves; the difference in uptake due to leaf age was not so great with a large-leaved species of box. P uptake by the lower leaf surface of *Buxus sempervirens* was almost 3 times as rapid as by the upper surface. *Zebrina* leaves without chlorophyll were more active in P uptake than were green leaves. At relatively low levels of P in solution the P content of strawberry leaves after immersion was positively correlated with the concentration of the solution. A similar trend was observed with *Zebrina*, capsicum and *Primula sinensis*.

46. Journal of the Science of Food and Agriculture.
Symposium on trace elements in soils, plants and animals, organized by the Agricultural Group and the Bristol Section of the Society of Chemical Industry, at Bristol, April, 1957.
J. Sci. Food Agric., 1957, Vol. **8**, Suppl. Issue, pp. 127.

Papers read at the Symposium are published in this supplementary issue and include the following review articles of horticultural interest: Iron chelates in plant nutrition, by C. Bould. Aspects of molybdenum as an essential nutrient for higher plants, by E. J. Hewitt. Role of trace elements in the nitrogen metabolism of plants with special reference to micro-organisms, by D. J. D. Nicholas. Trace elements and crop production in the tropics, by R. A. Webb. The application of chromatography to nutrition problems in plants, by A. H. Williams. The complexing of copper with natural components of fruit, by C. F. Timberlake.

47. Soil Science.
Chelates in plant nutrition.
Soil Sci., 1957, Vol. **84**, No. 1, pp. 97, bibls, illus.

The whole of this number consists of a symposium by various authorities on the chemistry and practical application of chelates in plant nutrition. Papers of horticultural interest have been abstracted separately.

48. DeKock, P. C., and Mitchell, R. L.
Uptake of chelated metals by plants.
Soil Science, 1957; **84**: 55-62, bibl. 11.

Experiments with mustard and tomatoes indicate that divalent cations (Co, Ni, Zn, Cu) which are readily taken up by plants when present in solution in ionic form are not so readily absorbed when chelated, particularly with EDTA. There is also a reduction in uptake of these metals when Fe-EDTA replaces ferric chloride as the source of iron. Trivalent cations (Cr, Al, Ga, In), which are taken up only in trace amounts when present in ionic solution, are on the other hand readily taken up and translocated to the leaves when present in chelated form. Less is absorbed when DTPA is the chelating agent than with ATA [ammonia triacetic acid] or EDTA, at least for Cr, Al, and Ga. A possible explanation is that the charge on the chelated molecule is one factor controlling absorption by the root, those with no charge or a single negative charge being taken up while complexes with 2 charges are not. [Authors' summary.]—Macaulay Inst. Soil Res., Aberdeen.

49. Whittington, W. J.
The role of boron in plant growth. I. The effect on general growth, seed production and cytological behaviour.
J. exp. Bot., 1957, **8**: 353-67, bibl. 28, illus.

The relation of boron to vegetative growth and seed production of *Trifolium pratense* L. and *Vicia faba* L. has been studied using sand and water culture techniques. It was found that the addition of a very small quantity of boron was sufficient to restore deficient plants to normal growth and it would appear that boron fertilizers will only be beneficial where deficiency symptoms have been shown. The rapid cessation of cell division under conditions of boron deficiency was demonstrated and was responsible for a decrease in both vegetative and seed yields through reduced branching and flower differentiation. No special association of boron with the functioning of pollen or with chromosome behaviour was found. The cessation of cell division is responsible for the abnormalities associated with boron deficiency but the cellular reactions involved remain unknown. Previous suggestions of the role of boron in plant metabolism are discussed in the light of the conclusion that boron is essential for the maintenance of meristems. [Author's summary.]—School of Agric., Univ. of Nottingham.

50. Smith, H. J., McIlrath, W. J., and Bogorad, L.
Some effects of iron deficiency on flowering of *Xanthium*.
Bot. Gaz., 1957, **118**: 174-9, bibl. 13, illus.

Cocklebur plants (*Xanthium pennsylvanicum* Wallr.) exhibiting iron-deficiency symptoms during photoinductive treatment either did not flower subsequently or flowered abnormally when maintained on complete nutrient solution. The abnormal flowering was characterized by (a) the delayed appearance and slower development of terminal staminate inflorescence primordia, (b) the development of pistillate inflorescences, which were surrounded by "rosettes" of many leaves, and (c) the failure of pistillate inflorescences to produce mature burs. Plants which had recovered from iron deficiency and were then subjected to photoinductive treatment flowered normally. A low carbohydrate level in −Fe plants during induction is apparently not responsible for their abnormal flowering, since −Fe plants supplied with 10% sucrose solution during photoinductive treatment also flowered abnormally. The −Fe plants supplied with sucrose soon exhibited more vigorous stem elongation than did −Fe plants not given sucrose, which suggests that the sucrose has been utilized. Aberrant flowering occurred in some photo-induced control plants; this flowering consistently differed from abnormal flowering in −Fe plants with respect to time of appearance of inflorescence primordia, number of aberrant and normal inflorescences per plant, and maturation of burs. [Authors' summary.]—Univ. of Chicago.

51. Possingham, J. V., and Brown, R.
Intracellular incorporation of iron-59 into the root cells of *Pisum*.
Nature, 1957, **180**: 653-4, bibl. 6, illus.

Photo-micrographs of young pea-seedling root tips which had been immersed in a solution containing radioactive Fe showed a relatively greater concentration of Fe in the nucleus than in the cytoplasm. This suggests that Fe is essential for cell division.—A.R.C., Dep. Agric., Oxford.

52. Iijima, T.
On the physiology and utilization of vitamin B_1 in garden crops. X. Influences of various agricultural chemicals mixed with thiamine on thiamine activity in plants. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 33-6, bibl. 13, illus.

When thiamine foliar sprays were mixed with acidic chemicals or with urea the stability of thiamine was high and yield responses were good, but in combination with alkaline chemicals stability and yield responses were low. [For parts VII and VIII see *H.A.*, 27: 1479 and 3416.]

Soil management, composts and irrigation.

(*See also* 144-146.)

53. Webster, G. R., and others.
Sawdust for horticultural crops.
[*Mimeo.*] *Publ. Domin. exp. Fm, Saanichton, B.C.* **165**, 1957, pp. 20, illus.

The use of sawdust, either as a mulch or incorporated in the soil, has been studied at Saanichton since 1948 [for earlier reports see *H.A.*, 22: 60, 23: 89, 24: 55 and 3416]. In this bulletin the latest results are reported on weed suppression, crop responses, fertilizer requirements, soil moisture, soil structure, and soil and air temperatures. Results of experiments with individual crops, together with recommendations based on them, are given, the crops including loganberries, boysenberries, strawberries, pears, cherries, peaches, dwarf apples, spinach, carrots, tomatoes, newly-seeded lawns, tulips, irises and roses.

54. Vogel, G.
Weitere Untersuchungsergebnisse über die Kompostdämpfung. **(Further results on compost sterilization.)**
Dtsch. Gartenb., 1957, **4**: 177-8, bibl. 1, illus.

A method of steam sterilizing compost with the aid of drainage pipes [see *H.A.*, 27: 48] has been further improved by covering the heap with a plastic film (0·1 mm. thick). The average temperature in the heap after 2 hours' steaming was 95·1° C.—Inst. Gartenb., Grossbeeren.

55. Budzier, H. H.
Zur Frage der besonderen infektions-bzw. dispositions-prophylaktischen Wirkung einer Indore-Kompost-Düngung. **(Prophylactic effect of manuring with Indore compost.)** [Russian and English summaries 9 lines each.]
Arch. Gartenb., 1957, **5**: 62-75, bibl. 22, illus.

On the basis of a series of laboratory and field tests it is shown that Indore compost has no specific prophylactic effect, but that effects noted are due to a definite improvement in the conditions of habitat and nutrition. [From author's summary.]—Univ. Rostock.

56. QUACKENBUSH, T. H., AND OTHERS.
Conservation irrigation in humid areas.
Agric. Handbook Soil Cons. Serv., U.S. Dep. Agric. **107**, 1957, pp. 52, illus.

The principles and methods of irrigation appropriate to relatively humid regions differ from those required in arid regions in several important ways. This handbook provides a valuable guide to the principles underlying the irrigation of crops in humid areas and discusses in detail, with the aid of many clear illustrations and diagrams, the supply of water and methods of applying it by sprinkler, surface irrigation and subirrigation.

57. SCIARONI, R. H., BOOHER, L. J., AND SANDLIN, B. C.
Sprinkler fertilizing system.
Calif. Agric., 1957, **11**(10): 6, 13, illus.

NPK fertilizers are being applied in sprinkler irrigation water by a number of vegetable and flower growers in San Mateo County, California, and the method has proved both effective and economical. Practical experience gained in its use is outlined, and two units, the Venturi and the Pitot, used to inject fertilizer solutions into the irrigation pipe line are illustrated.—Univ. Calif., Davis, etc.

58. STANHILL, G.
The effect of differences in soil-moisture status on plant growth: a review and analysis of soil moisture regime experiments.
Soil Sci., 1957, **84**: 205-14, bibl. 80.

Of the 80 experiments reviewed, only 14 showed no correlation between soil moisture depletion and plant growth, and in almost every instance where vegetative growth was recorded this was reduced by low soil moisture status. Lack of correlation appeared in 13 field experiments, but in only 1 experiment where containers were used, the crop in the latter instance being sugar cane. Other crops included various fruit trees, vines, several vegetables and ornamentals, tobacco and guayule.

Glasshouses and hotbeds.

(*See also* 6, 68f, g, l, 399, 658, 989, 994, 1000.)

59. FOLLEY, R. R. W.
Studies in the economics of intensive horticultural holdings. Report 1. Business aspects of horticultural production under glass.
(*Publ.*) *Wye Coll. Dep. agric. Econ.*, 1957, pp. 27.

In this, the first of 3 reports purporting to make an economic assessment of British intensive horticultural production, the general business aspects are surveyed. The second will deal with management problems and the third with the amount and character of investment in holdings. G. P. Wibberley, Head of the Department, warns the reader that these reports contain few hard and fast conclusions which growers can immediately put into operation. In fact they serve "to open up a very big subject, underlining some of the important economic features in horticultural production and pointing out problems which need solving". Attention is restricted in this report to nurseries covering not more than 20 acres, having not more than 80,000 sq. ft. (2 acres) of glass and a turnover not exceeding £30,000. It is based on returns from nurseries in 7 glasshouse areas, namely West and East Sussex, North and East Kent, Surrey, Lancashire and East Yorkshire.

60. COCHRAN, G. W.
A compactly designed plastic greenhouse.
Farm and Home Sci., reprinted in *Market Grs' J.*, 1957, **86**(8): 17, illus.

Details are given of the construction and costs of a polythene plastic greenhouse designed at Logan, Utah, to cover a 33 ft. square nursery cutting bed without any central supporting pillar. The ridge is 22 ft. high but there is an inner layer of plastic to give a ceiling of 9 ft. high in the centre, thus providing insulation and reducing heating costs. The house is heated with propane gas heaters and provided with forced ventilation.

61. NISEN, A.
Économie de combustible et constructions horticoles. **(Fuel economy and horticultural buildings.)**
Bull. Inst. agron. Gembloux, 1957, **25**: 139-78, bibl. 10, illus.

The author has calculated formulae for the heat loss in glasshouses through the glass and the wooden framework. In a numerical example he shows that in 2 standard glasshouses the heat loss is about 11,000 kcal per hour, of which more than 90% is due to the weak insulation of glass. Uneven span houses and thicker glass showed only slight reductions in heat loss. Double glass with a layer of air between was very effective in reducing heat loss; it is shown that separation of the glass panes should be about 6–12 mm., at which distance air movement between the panes is small and insulation is maximum. The substitution of plastic for glass is briefly discussed. [For earlier work see *H.A.*, 25: 87.]

62. SIDOROV, V. JA.
Theoretical principles and experimental data on heating hotbeds with a steam-air mixture.
[Russian.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 2, pp. 111-20, illus.

A method of heating hotbeds with a steam-air mixture was successfully tested at the Vegetable Experiment Station of the Timiryazev Agricultural Academy and is now being used on some collective farms. It is compared with hot water and high pressure steam heating, and engineering and other aspects of the system are discussed.

Machinery and special devices.

(*See also* 68o, 147, 323-325, 1002.)

63. WESTERN FRUIT GROWER.
Mechanical harvesting.
West. Fruit Gr, 1957, **11**(6): 17-29, illus.

This number contains a series of articles on the mechanical harvesting of almonds, walnuts, prunes, figs, olives and grapes in California. Types of tree-shaking and pick-up machines are compared, and preparation of the ground and cost factors are discussed.

64. Sandrini, M.
L'impiego in agricoltura di polietilene e del "plastocanale". (Agricultural uses of polythene and plastic tubing.)
Progr. agric. Bologna, 1957, **3**: 577-9, illus.

Lengths of sheeting over hoops to protect rows of vegetables, etc., substitution for glass in frames, wrapping plants for transport, and perforated tubing for furrow irrigation.

65. Charter, S.
Aerial photos tell more.
West. Fruit Gr, 1957, **11**(5): 30, 32, illus.

By the development of new aerial photographic techniques, particularly the use of infrared-sensitive films, it has proved possible to record, over a large orchard area, information on the distribution of bearing and non-bearing trees, variety and condition of the trees, the degree and area of infestation by pests and diseases, frost damage and other details. Some of the conditions revealed are invisible to the naked eye even at ground level. The principles, scope and economics of the technique are briefly discussed.—Resources Res. Inc., San Francisco.

Packing.

(*See also* 665.)

66. Smith, T. B., and Browning, J. W.
Fresh fruit and vegetable prepackaging, Northeastern region, operating season—1954-55.
Mktg Res. Rep. U.S. Dep. Agric. **154**, 1957, pp. 43.

This report, covering the northeastern United States, represents part of a nation-wide survey of fresh produce packaging plants throughout the U.S. Information is presented on what commodities are being prepackaged, what types and sizes of package are used, what types of machinery and equipment are used, and what experimental methods are being tested. A total of 58 firms was surveyed. Data are tabulated for 5 types of fruits (apples, oranges, lemons, grapefruit and blueberries) and about 30 vegetables.

67. Wiss, C. B. L. (and Ludergnani, G.).
Vie nuove per l'imballaggio dei prodotti ortofrutticoli. **(New ways of packing fruit and vegetables.)**
Frutticoltura, 1957, **19**: 377-81, illus.

Polythene and cellulose films produced in England are described and their uses as direct wraps, bags and covers for baskets and boxes.

Noted.

68.

a Anon.
Advances in mist propagation.
Comm. Gr, 1957, No. 3226, p. 787, illus.
The MacPenny mist propagation unit described.

b Berger, C. A.
Some cytological effects of gibberellin.
Bull. Torrey bot. Cl., 1957, **84**: 356-60, bibl. 3, illus.
Effects studied on roots of *Allium cepa* and compared with those of colchicine and NAA.

c Berneking, A. D., and Schrenk, W. G.
Flame photometric determination of manganese, iron, and copper in plant material.
J. agric. Food Chem., 1957, **5**: 742-5, bibl. 16.

d Condelli, F.
L'accélération de la maturation des fruits et autres procédés analogues appliqués aux produits végétaux. **(Acceleration of fruit maturity and other similar methods applied to plant products.)**
Fruits et Prim., 1957, **27**: 96-109, bibl. 18, illus.
A review of techniques used for fruits and vegetables.

e Essenburg, J. F.
Gibberelline, een literatuuroverzicht. **(Gibberellin, a survey of the literature.)**
Reprinted from *Landbouwdocumentatie*, 1957, **13**: 259-66, bibl. 11.
Summary of article by Stowe and Yamaki [see *H.A.*, 27: 3090m] with review of articles published subsequently.

f Evison, J. R. B.
Problems of ventilating and air conditioning greenhouses.
Park Administ., 1957, **22**: 173-6, illus.
Temperature, humidity and air movement, and the use of natural and forced ventilation and shading.

g Evison, J. R. B.
Some problems in greenhouse heating and ventilation.
J. roy. hort. Soc., 1957, **82**: 333-8, illus.
Details of new glasshouse erected by Superintendent of Parks and Gardens, Brighton.

h Fujiwara, A., and Suzuki, M.
Studies on the carbon metabolism in the higher plant. I. On the newly devised apparatus for the measurement of photosynthesis.
Tohoku J. agric. Res., 1957, **7**: 383-9, bibl. 7, illus.

i Hewitt, E. J.
Some aspects of micronutrient element metabolism in plants.
Nature, 1957, **180**: 1020-22, bibl. 39.
A review, mainly concerned with enzyme activity.

j Larsen, P.
The development of geotropic and spontaneous curvatures in roots.
Physiol. Plant., 1957, **10**: 127-63, bibl. 14, illus.
Studies on roots of *Artemisia absinthium* [for preliminary account see *H.A.*, 27: 978].

k National Institute of Agricultural Engineering.
The Bomford Hedge-Maker Minor.
[*Publ.*] *Nat. Inst. agric. Engng*, Wrest Park, **126**, 1956, pp. 15, illus.

l P——, E.
La serra meccanizzata. **(Mechanized frames.)**
Frutticoltura, 1957, **19**: 385-7, illus.
Description of the Dvorák frame produced in Prague, fitted with devices for opening and irrigation.

m Padhye, V. P.
A rapid method for the determination of calcium and magnesium in plant material by titration with disodium ethylenediaminetetraacetate.
Analyst, 1957, **82**: 634-8, bibl. 5.
Method described and results obtained in analysing leaves of banana, cashew, coffee, etc.

n Pinto, J. A. G.
Pré-embalagem de frutas e produtos hortícolas. Suas relações com a normalização. (A experiência de Milão.) **(Pre-packaging fruits and horticultural products. Its relationship to standardization. (Experience in Milan.))** [English and French summaries $\frac{1}{3}$ p. each.]
Bol. Junta nac. Frut. Lisbon, 1954, **14**: 17-28, illus. [received 1957].

o Plock, H.
Die langersehnte Zapfenschnittschere. **(A pair of cutters for snagging.)**
Dtsch. Baumsch., 1957, **9**: 287-9, illus.
Saves injury to man and plant.

p Renier, A.
Classification et description des dispositifs expérimentaux. **(Classification and description of experimental lay-outs.)**
Ann. Inst. exp. Tabac Bergerac, 1954, **2**(1): 103-49, bibl. 10 [received 1957].
Includes application to tobacco.

q Rogers, M. N.
A small electrical hygrometer for microclimate measurements.
Plant Dis. Reptr, 1957, **41**: 897-902, bibl. 21, illus.
See *H.A.*, 27: 2080.

r Schütte, K. H.
The significance of micronutrients.
Econ. Bot., 1957, **11**: 146-59, bibl. 42.
A review of their effects on plant growth, disease resistance and nutritional value.

s Stoughton, R. H.
Electricity in efficient horticulture.
[*Publ.*] *Seale-Hayne agric. Coll., Newton Abbot, Devon*, [1957?], pp. 18.
The George Johnstone lecture for 1956.

t Viel, G., and Gusse, J. F.
Microméthode d'analyse du dibrométhane dans les fruits et les terres. **(Microdetermination of ethylene dibromide in fruits and soils.)**
Ann. Épiphyt., 1957, **8**: 165-70, bibl. 5.

u Wain, R. L.
The chemical regulation of plant growth.
Agric. Progr., 1955, **30**(2): 79-89, illus., reprinted as *Reprint Wye Coll., Univ. Lond.* **95**.
A review, with special reference to the mode of action of growth substances. [See also *H.A.*, 27: 67m.]

v Wallace, T.
Trace elements in plant nutrition.
J. roy. Soc. Arts, 1957, **105**: 515-34.
World Crops, 1957, **9**: 289-92, illus., and 343-5.
The Fernhurst lecture and a summary thereof.

w Wybenga, J. M.
A contribution to the knowledge of the importance of sodium for plant life. Investigations with radioactive sodium. [A thesis.]
Kantoordruk de Goede, Wageningen, 1957, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 211 plus 4 colour plates, bibl. 297, illus.
The study was carried out on oat plants.

x Youard, G. B.
Farm roads.
Bull. Minist. Agric. Lond. **145**, 1957, pp. 73, illus., 4s. 6d.
Principles of road construction and maintenance on farms and fruit farms.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1, 5, 65, 180d, n, o, 965, 966, 1006.)

69. Royal Horticultural Society.
The Fruit Year Book 1958, No. 10.
R.H.S., Vincent Square, London, 1957, $9 \times 5\frac{1}{2}$ in., pp. 176, illus., 10s.

As a result of the poor demand, it is now only possible to publish the yearbook biennially, but this issue contains almost twice as many articles as the previous one, and these cover a wide range of fruit growing interests. Several of the articles of particular interest to amateurs are concerned with growing fruit in restricted forms, but experience in growing peaches as bush trees in a Kent garden is also described. On a larger scale, impressions of commercial fruit growing in the Eastern counties of England and in Poland are described, and there is a practical article on methods of staking fruit trees. Historical aspects are covered by articles on John Laurence and his pears, on nineteenth-century English fruit books, and on the history of gooseberry, perry pear and apple growing in England. Other articles are included on hothouse vines, on apricot varieties, on red currants and on some Jamaican fruits. Recognition of fruit injuries, earwigs as orchard pests, and a fruit group discussion on the new look in fruit spraying form a group of pest and disease control articles.

70. Pieniążek, S. A., and others.
Uroczyste otwarcie Centralnego Laboratorium Instytutu Sadownictwa w Skierniewicach oraz VII Naukowy Zjazd Sadowniczy, maj, 1956. **(Official opening of the Central Laboratory of the Research Institute of Pomology at Skierniewice and the 7th Pomological Scientific Conference, May, 1956.)**
Prace Inst. Sadown. Skierniewice, 1957, **2**: 1-232, bibls, illus.

Prof. S. A. Pieniążek, director of the Institute of Pomology at which this conference was held, introduces the proceedings with an outline of the functions and aims of the Institute [see also *H.A.*, 27: 69], founded in 1951. Then follow the 12 papers presented at the conference, 6 by Polish and 6 by foreign scientists and all in Polish with English and Russian summaries. Some of these have been abstracted separately [see abstr. 110, 127, 151 and 315]. Others include: Frost protection methods in orchards, by N. G. Žučkov. Some application of virus research to raspberry and strawberry breeding, by C. H. Cadman. Some problems of fruit ripening, by R. Ulrich. Current problems of fruit breeding in Hungary, by A. Porpáczy. The importance of fertilizers for higher yields in fruit trees, by N. D. Spivakovski. Formation of crotch angles in apple trees [see also *H.A.*, 27: 129], by L. Jankiewicz. Perithecial and conidial stages of *Venturia pirina* as sources of primary infection, by Z. Borecki.

71. Carlone, R.
Lo stato attuale della frutticoltura in Cina. **(The present state of fruit-growing in China.)**
Reprinted from *Progr. agric.*, 1957, **3**(1/2), pp. 15, illus.

Among temperate fruits pear, apple and peach are predominant, while apricot, plum and cherry are less important. The main tropical and subtropical fruits are citrus, banana, pineapple and litchi and those of secondary importance are carambolo (*Averrhoa carambola*), *Canarium album*, papaw, *Euphoria longana* and persimmon. Varieties, and in some cases yields and production figures, are given for the principal fruits in both sections.

72. Marquardt, W.
Der Arbeits- und Zugkräftebesatz in Baumschulbetrieben. **(The distribution of labour and tractors in nurseries.)**
Gartenbauwiss., 1957, **22***: 147-72, bibl. 8.

Data on the ratio of man- and tractor-power to size and type of nursery have been collected from fruit, ornamental and forestry nurseries in the Holstein area, and are summarized.

73. Rolin, P.
La rentabilité en culture fruitière. **(Economic aspects of fruit growing.)**
Fruit belge, 1957, **25**: 65-71, 90-6, 105-12, 122-8, bibl. 8, illus.

Costs of production are compared for 3 dessert apple varieties grown as spindle bushes, as bushes on vigorous stocks, and as bushes on the permanent/filler system. The general costs were similar for all 3 systems with a slight bias in favour of the spindle bush form, which in spite of its high initial outlay produced early regular crops of good quality fruit. The permanent/filler system may be useful for growing varieties unsuitable for dwarf stocks.

74. Mercuri, S.
Peschicoltura protetta dal polietilene. **(Peach growing under protective polythene.)**
Ital. agric., 1957, **94**: 801-8, illus.

A simple method of joining polythene sheeting with an electric iron is described. Incorporation of 2% carbon black during manufacture increases durability and resistance to insolation. Large bags may be used to cover flowering and fruiting branches and bell-shaped covers are made for small individual trees. A whole row of small trees may be covered by a "tunnel" of sheeting hung over metal or wooden hoops and weighted at the edges with soil. The ends are ventilated by draping the sheeting round short lengths of drain tile, which can be pushed into position according to the wind direction. Tobacco seedlings in beds under polythene were ready for transplanting 20 days before those under gauze. On peach branches covered with polythene at fruit set the fruit ripened 15–20 days earlier and was more attractively coloured than that on exposed branches. The covers were an effective protection against spring frosts.

75. Evréinoff, V. A.
Contribution à l'étude du grenadier. **(Contribution to the study of the pomegranate.)**
J. Agric. trop. Bot. appl., 1957, **4**: 124-38, bibl. 32, map, and *Fruits et Prim.*, 1957, **27**: 110-16, bibl. 38.

A review, including fruit and seed composition, history of cultivation, requirements, propagation, planting, irrigation, manuring and a comprehensive annotated list of varieties.

Breeding and varieties.

(*See also* 175, 180f, g, i, k, p, r, v, y, z, 181a, d, f-h.)

76. Balsgård (Nybom, N., and Oldén, E. J.).
Föreningen för Växtförädling av Frukträd. Verksamhetsåret 1956. **(Annual Report of Balsgård Fruit Breeding Institute for 1956.)**
[English summary 3½ pp.], 1957, pp. 27.

The aim of hybridization among pome fruit varieties has been the production of early maturing and late-keeping apples and high yielding pear varieties suitable for Swedish conditions. Successful apple/pear crosses have been made. The cherry programme includes breeding for hardiness and disease resistance. The breeding of improved European plum varieties and the crossing of hexaploid and diploid plum varieties are reported. Strawberry breeding is in progress. Other projects include studies on the wood/bark ratio in apple rootstocks, and the induction of mutations by gamma irradiation and ethylene oxide.

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77. Zwintzscher, M.
Beiträge zur Vererbung des Frostverhaltens der Obstgehölze. I. Die Reaktion von Kreuzungsnachkommenschaften des Apfels, der Birne, Pflaume und Kirsche auf den Barfrost im Februar 1954. **(Studies on the inheritance of frost resistance in fruit trees. I. The reaction of hybrid progeny of apple, pear, plum and cherry to the black frost of February, 1954.)**
Gartenbauwiss., 1957, **22***: 50-70, bibl. 8.

Frost damage to young trees of apple, pear, plum, cherry and a peach-almond hybrid was determined after a long period of cold weather (minimum temperature −20° C.). The observations have indicated that the inheritance of frost-resistance is not dominant; frost-resistant seedlings occurred in the progeny of 2 frost-susceptible varieties of both apple and pear. Thus the value of a variety for breeding cannot be deduced from its own degree of frost resistance, but is dependent on the combination in which it is used as a parent. The use of frost-resistant wild species is not recommended in breeding for hardiness. A plan for breeding for frost-resistance, based on these observations, is briefly outlined.—Max-Planck-Inst. Züchtungsforsch., Cologne.

78. Anon.
New fruit varieties announced for northern gardeners.
Amer. Nurserym., 1957, **106**(7): 68-9.

Notes are given on the following new varieties suitable for home gardens in the northern Great Plains region: Garrison Thorberg, Peace Garden and Killand apples, Gracious and Chinook plums, Sacagawea and Hiawatha sand-cherries, and Mantoy apricot.

79. Crang, A., and Sturdy, M.
A comparison of some varieties of fruit preserved by bottling and by freezing: Progress report VII.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 170-5, bibl. 3.

Notes on the bottling and freezing merits of a number of pear, gage, raspberry and strawberry varieties, and of means of overcoming difficulties in the attainment of satisfactory results.

80. Torfason, W. E.
A progress report to the Nutrition and Chlorosis Committee.
Cumming, W. A.
Progress report on the selection of chlorosis resistant clonal rootstocks of *Malus* at the Dominion Experimental Farm, Morden, Man.
Russell, W. A.
Selection of chlorosis resistant apple seedlings.
Rep. Proc. 13th annu. Mtg west. Canad. Soc. Hort. 1957, Regina, Sask., pp. 6, 7-8 and 8-9.

The first of these short reports records that among 9,630 open-pollinated seedlings from 17 crabapple varieties under trial as chlorosis-resistant apple rootstocks at Lethbridge, Alberta, 504 showed chlorosis. Among the different parents the percentage of chlorotic seedlings ranged from 0·67 to 21·43. At Morden, Manitoba, 6,946 open-pollinated seedlings from 24 species and varieties and 659 controlled-cross seedlings from 22 *Malus* combinations have been set out over 3 years in an area known to suffer severely from lime-induced chlorosis. Among seedlings of 17 varieties recorded in 1956 the incidence of chlorosis ranged from 18 to 95%. In addition, out of 84 varieties and selections on their own roots 25 were rated as good, 23 as fair and 36 as poor.
The third paper records observations on seedlings of 29 species, varieties and controlled crosses at Indian Head, Saskatchewan. About 50 chlorosis-free selections were made in 1955, but in 1956 only 11 selections could be made, because of a marked decline in the incidence of chlorosis as the season progressed.

81. Anon.
A revised list of recommended varieties of cider apples.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 44-47.

A list of 26 varieties is given with season of blossoming, suitable pollinators, self-fertility, size and habit of tree and notes on orchard behaviour.

82. Carlone, R.
Le specie del genere *Malus* (Miller) esistenti in Cina e loro utilizzazione in frutticoltura. **(*Malus* species in China and their use in fruit growing.)**
Reprinted from *Ann. Accad. Agric. Torino*, 1956/57, Vol. **99**, pp. 37, bibl. 18, illus.

This interesting account of 20 *Malus* species known and used in China is based on information acquired by the author from many named Chinese authorities and the relevant literature. Botanical characters, synonyms, uses and distribution are discussed of the following: *Malus baccata*, *manshurica*, *rockii*, *hupehensis*, *halliana*, *pumila*, *asiatica*, *prunifolia*, *spectabilis*, *micromalus*, *sieboldii*, *kansuensis*, *toringoides*, *transitoria*, *prattii*, *ombrophila*, *honanensis*, *yunnanensis*, *formosana* and *melliana*.

83. Carlone, R.
Le specie del genere *Pyrus* originarie della Cina e loro utilizzazione in frutticoltura. **(Species of the genus *Pyrus* native to China and their use in fruit growing.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 375-89, bibl. 9, illus.

Out of the 12 pear species native to China, the 3 cultivated for fruit are *P. pyrifolia*, *P. bretschneideri* and *P. ussuriensis*. Others which are resistant to blight (*Erwinia amylovora*) and mostly vigorous are used as rootstocks. They are *P. serrulata*, *P. phaeocarpa*, *P. betulaefolia*, *P. calleryana* and *P. pashia*, some of which have been successfully introduced into Russia and the U.S.A. All 8 species are described. *P. ussuriensis* is cold resistant and *P. calleryana* is highly resistant to blight. Important hybrids have been produced between *P. pyrifolia* and *P. communis*.

84. Howlett, F. S.
Preliminary evaluation of new and uncommon pear varieties including comparison with standard sorts.
Res. Bull. Ohio agric. Exp. Stat. **790**, 1957, pp. 131, bibl. 18, illus.

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The behaviour of 138 pear varieties, strains and seedlings has been tested, and brief general descriptions, with major fruit characteristics and illustrations, are given. Varieties introduced and those which were of some importance at the beginning of the century are included. Fourteen of the most promising varieties for Ohio conditions are listed.

85. ANON.
Max-red Bartlett gains ground.
West. Fruit Gr, 1957, **11**(7): 30-1, illus.

An assessment is made of the commercial value of this bud mutation from Bartlett pear found in 1938 [see also *H.A.*, 21: 3246]. The red flush gives the fruit a strong market appeal. There is little difference between the parent and the mutant in texture, flavour or storage life, but the mutant develops less core breakdown and scald during storage. It also has a thicker skin and suffers less from abrasions and discoloration caused by handling. There is a tendency for limbs or spurs on Max-Red trees to revert to the standard Bartlett type.

86. PLOCK, H.
Probleme der Marillenkultur. **(Observations on apricot growing.)** [English, French and Spanish summaries 1½ lines each.]
Mitt. Klosterneuburg, Ser. B. 1957, 7: 249-54, bibl. 1, illus.

Descriptions and photographic illustrations of the stones are given of 9 American and Russian apricot varieties which were raised from seed by the author. It is suggested that these varieties should be tested as apricot rootstocks. [See also *H.A.*, 27: 2119.]

87. CAPUCCI, C.
Una nuova varietà di albicocco. **(A new apricot variety.)**
Frutticoltura, 1957, **19**: 437-41, bibl. 2, illus.

The principal varieties grown in Emilia (Italy) are mentioned. The new variety (C. Capucci No. 1) arose as a bud mutation from Reale d'Imola grafted on a seedling of the same variety. It flowers later and ripens earlier than the original.

88. BREVIGLIERI, N.
La peschicoltura italiana ed europea. Il problema varietale nei risultati di un'indagine nazionale e nelle promesse delle nuove cultivar. **(Peach growing in Italy and elsewhere in Europe. The varietal problem in the light of a national inquiry and of the promise shown by new strains.)**
Ital. agric., 1957, **94**: 731-88, bibl. 2, illus.

Italian and French production figures are compared for the period 1932–56. Varieties established and recently introduced in Italy are listed and briefly described.

89. WARNER, R. M.
New fig varieties which escape vinegar fly damage.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 6-8.

Comparative tests have shown that the Conadria fig is less prone to attacks by the vinegar fly [*Drosophila* sp.] and to souring than the Adriatic. In one orchard two new varieties 70–74 and 70–62 both yielded well particularly at the first crop; the latter also had an early maturing second crop which escaped attacks by the vinegar fly. J.R.L.

Propagation and rootstocks.

(*See also* 35, 170, 180 l, m, w, 728, 741, 985.)

90. GLEISBERG, W.
Baumschulforschung. **(Nursery research.)**
Gartenbauwiss., 1957, **22***: 3-25, bibl. 167.

In a review of the course of fruit nursery research in the last 50 years the author discusses the problems of seasonal rhythm in the development of woody plants, the stock/scion relationship, the breeding of woody plants, and cold resistance.

91. SAX, K.
Dwarf fruiting trees.
Horticulture, Boston, reprinted in *N.Z. Gdnr*, 1957, **13**: 663-4.

In the course of a short survey of methods of dwarfing trees the author mentions that the following are among the combinations of species that have produced dwarf trees at the Bussey Institution: Seckel pears on cotoneaster interstocks on hawthorn rootstocks, peaches and plums on *Prunus besseyi* and *P. tomentosa*, lilac on *Syringa amurensis japonica*, and red maple on silver maple. Small trees, instead of spreading bushes, can be produced by working Japanese flowering quince on apple, flowering almond on *Prunus tomentosa* and cotoneaster on hawthorn.

92. FLOOR, J.
Verslag van onderstammen-onderzoek. **(Report on rootstock studies.)** [English summary 7 lines.]
Meded. Inst. Vered. Tuinbouwgew. **101**, 1957, pp. 30, bibl. 37, illus.

Several projects with apple, pear and plum rootstocks are discussed. Summer and winter characteristics of some MM rootstocks are described and illustrated. Methods of propagating virus-free plant material are described. Selection for a dwarf cherry stock has been carried out among Limburgse Boskriek seedlings, and several weak-growing *Prunus* varieties have been tested as cherry rootstocks [see also *H.A.*, 27: 2121].

93. EVANS, W. D., AND HILTON, R. J.
Methods of evaluating stock/scion compatibility in apple trees.
Canad. J. Plant Sci., 1957, **37**: 327-36, bibl. 12, illus.

Field and laboratory trials were carried out to test compatibility in 2 scion varieties grafted on 8 lines of seedling crabapple rootstocks, and to compare several methods of evaluating stock/scion compatibility. Evaluation methods were per cent bud "take", water conductivity through unions, macroscopic and microscopic scoring of the unions, strength-at-union and type of union break under stress. No obvious cases of incompatibility were found. Under these conditions, no marked correlations could be established between any of the evaluation methods, nor did these methods yield similar results. One or more of the methods evaluated may be reliable, however, where a greater range in compatibility is being studied. [From authors' abstract.]—Univ. Alberta, Edmonton.

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94. van Gammeren, F.
De vermeerdering van vruchtboomonderstammen en wortelechte fruitsoorten. (**The propagation of fruit-tree rootstocks and fruit varieties on their own roots.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 519-21, illus.

A rapid method of fruit tree propagation is described, using root cuttings taken in autumn and winter. The cuttings are about 3 cm. long and are boxed in a sand/peat mixture before removal to a heated glasshouse about mid-January. When the shoots are 1–2 cm. long the cuttings are potted up and, after hardening off, are planted outside in early May. The plants may be budded the following summer. With this method 99% of the M.IV cuttings produced shoots suitable for potting, and M.VII cuttings sometimes produced 2 shoots each.—Rijkstuinbouwconsulentsch., Geldermalsen.

95. Singh, S. M., Garner, R. J., and Hatcher, E. S. J.
The behaviour of softwood cuttings of apple in the open under intermittent mist and in a closed propagation frame.
J. hort. Sci., 1957, **32**: 239-47, bibl. 9.

Softwood cuttings of apple from several sources were taken at three periods of the year, given growth substance treatment and propagated in different environments. Intermittent mist with partial shade provided the best conditions for the full expression of rooting capacity; the cuttings continued to grow and had time for rooting. In an unshaded frame rooting was checked to some extent by leaf-scorching. In a closed propagation frame with bottom heat the limiting factor was survival. Rooting declined with the hardening of the source shoots as the season advanced. Cuttings from stool shoots rooted better than those from bedded plants; hedge cuttings were intermediate. Speed and degree of rooting were associated directly with vigour of the source plant, whether inherent in the variety or induced by cultural methods. Transference of the leafy cuttings to the open nursery needs further study. [Authors' summary.]—E. Malling Res. Stat.

96. Singh, S. M., Garner, R. J., and Hatcher, E. S. J.
The influence of source and environment on the performance of apple leaf-bud cuttings.
J. hort. Sci., 1957, **32**: 248-53, bibl. 5.

In experiments with 3 apple rootstock varieties the source of leaf-bud cuttings markedly influenced their rooting, speed and degree of rooting being linked with vigour of growth of the source shoot. This relationship held whether such vigour was inherent in the rootstock, induced by culture, or encouraged by favourable seasonal conditions. Success with a closed propagation frame was dependent on rapid rooting. Under intermittent mist in the open, with partial shade, the speed of rooting was not limiting and this environment was much the more favourable and was particularly suited to slower rooting cuttings. [Authors' summary.]—E. Malling Res. Stat.

97. Budagovskij, V. I.
On the origin of dwarf apple rootstocks. [Russian.]
Bot. Žurnal, 1957, **42**: 211-29, bibl. 34, illus.

The author reviews literature, mainly Russian, on apple rootstocks and describes, with the aid of illustrations, stocks known as Doucin II, III and V and Paradise VIII and IX, which are stated to originate from Trans-Caucasia. Descriptions are also given of dwarf apples growing in Georgia, Azerbajdžan and Dagestan, some of which closely resemble the Doucin and Paradise types.

98. Dolgov, V. F.
New dwarf apple rootstocks. [Russian.]
Priroda, 1957, **46**: 106-7, illus.

Notes are given on the dwarfing rootstock Krasnolistnaja paradizka [Red-leaved Paradise] (Paradise VIII × Mičurin's variety Krasnyj štandart [Red Standard]) and the semi-dwarfing Hybrid No. 13-14 (Paradise VIII × Taëžnoe [Siberian Forest apple]). Both were developed by V. I. Budagovskij at Mičurinsk.

99. Sadovnikova, G. I.
Some results of budding apples in the crown of frost resistant rootstocks. [Russian.]
Sad i Ogorod, 1957, No. 7, pp. 43-6, illus.

In the Molotovsk region, Cis-Urals, grafted apple trees after being transplanted from the nursery often suffer from injury caused to the stem bark by sun scorch and frost fissure. Experiments started in 1950 have shown that budding *in situ* onto the skeleton limbs of frost resistant rootstocks prevented stem injury and the unfavourable effect of transplanting and resulted in rapid, vigorous growth and early fruiting.

100. Scaramuzzi, F.
Alcuni rilievi sui rapporti che intercorrono fra vigoria e disaffinità negli alberi di pero innestati su cotogno. (**Observations on the relationships between vigour and lack of affinity in pears grafted on quince.**) [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 258-68, bibl. 14, illus.

A detailed anatomical study of numerous 5-year-old pear trees of 50 varieties showed no correlation between vigour and compatibility with the quince rootstocks. The least compatible varieties were Williams and Marguerite Marillat. The only 3 trees with excellent unions were of the varieties Abate Fétel, Buona d'Ezée and Curato.

101. Williams, R. R., and Campbell, A. I.
Rosetting and incompatibility of pears on quince A. Progress report I.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 51-6, bibl. 4, illus.

Increasing difficulty has been experienced in recent years in propagating dessert, culinary and perry pears on Quince A. Three types of abnormality have been observed: rosetting, brittle unions, and bud death. Preliminary investigations to determine the cause of these disorders are described, and the possibility that virus disease, incompatibility and winter injury are involved is discussed. [Authors' summary. See also *H.A.*, 27: 3248.]

102. SCARAMUZZI, F.
La diversa influenza delle radici e del fusto del soggetto sullo sviluppo del pero Kaiser innestato su cotogno. (**Different effects of the roots and stem of the rootstock on the development of Kaiser pear grafted on quince.**) [French and English summaries 10 lines each.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 476-86, bibl. 34, illus.

Kaiser pear developed well on pear and poorly on quince rootstocks. With quince as interstock and pear as rootstock development was as vigorous after the first year as on pear direct, but neither union was good and starch accumulated in the scion. [See also *H.A.*, 27: 3120.]

103. ERŠOV, L. A.
The compatibility of various peach varieties with different rootstocks. [Russian.]
Agrobiologija, 1957, No. 2, pp. 113-15.

The value of apricot, peach, myrobalan and almond seedling rootstocks for peaches was studied under dryland conditions in the steppe region of the Crimea. The percentage of take, production of transplants and vigour of 13 varieties of peach on these rootstocks are given. The behaviour of apricot rootstock, showing drought and frost resistance and salt tolerance, was of special interest, and some of its forms were found to be fully compatible with the varieties Nikitskij and Elberta and partially with Ak-šeftalju No. 3.

104. KOVALEV, N. V.
Propagation of peaches by seed. [Russian.]
Agrobiologija, 1957, No. 2, pp. 127-9.

In parts of Uzbekistan where peaches are severely frost damaged cutting back of seedling trees is followed by rapid regeneration, thus obviating replacement. For propagation by seed only homozygous varieties, producing uniform progeny, should be used. A list of such varieties, which includes Elberta, is given. It is stated that from these varieties hybrid seed producing uniform progeny can be obtained.

105. DALBRO, K.
Forsøg med forskellige grundstammer til kirsebaer 1935–1954. (**Cherry rootstock trials 1935-54.**) [English summary ¾ p.]
Tidsskr. Planteavl, 1957, **61**: 474-94, bibl. 13, illus.

Full data are tabulated on these trials which had the object of comparing clonal cherry rootstocks from East Malling with certain seedling rootstocks. The stocks were worked with 2 acid and 2 sweet cherry varieties. Best results as regards health, longevity and yields of both acid and sweet cherries were obtained with the East Malling stock F2/1, but *Prunus mahaleb* seedlings also proved fairly satisfactory for acid varieties.—Blangstedgaard.

106. STOLLE, G.
Das unterschiedliche Dickenwachstum der Veredlungspartner als Kriterium für die Auslese bei *Prunus mahaleb* L. als Sämlingsunterlage für Schattenmorellen. (**Differences in girth increment of the graft partners as a criterion for the selection of *Prunus mahaleb* L. as a seedling rootstock for morello cherry.**)
Gartenbauwiss., 1957, **22***: 81-6, bibl. 6.

Differences in stem diameter between some forms of *Prunus mahaleb* stock and morello scion became greater as the rate of growth of the rootstock increased. Other forms of *P. mahaleb*, which were culturally more desirable, combined strong growth with smaller differences in stem diameters between stock and scion.

107. KATZFUSS, M.
Untersuchungen über Kalium-, Kalzium-, Natrium- und Kohlenhydratgehalt der Blätter zweier Kirschedelsorten auf verschiedenen Unterlagen. (**Research on the potassium, calcium, sodium and carbohydrate contents of the leaves of two varieties of cherry on different rootstocks.**) [Russian and English summaries 9 lines each.]
Arch. Gartenb., 1957, **5**: 27-46, bibl. 24.

The influence of different rootstocks was studied on the K, Ca, Na and carbohydrate contents of the leaves of the English Morello as compared with the leaves of Köröser Weichsel. The rootstock obviously influences the mineral content of the leaves, and the scion also has some control on the absorption of nutrients. The starch content of the leaves is subject to great fluctuations during the whole of the vegetative period, but it is not influenced by the stock. The reducing sugars in the leaves are not subject to such great fluctuations, and the rootstock appears to have no influence on them. —Inst. Obst- u. Gemüseb. Martin-Luther-Univ., Halle-Wittenberg.

108. KOLTUNOV, V. F.
Budding of plums without wood. [Russian.]
Sad i Ogorod, 1957, No. 7, pp. 47-8.

When Green Reine Claude was budded onto cherry plum, the use of bud shields with the wood removed resulted in 18·7% more 1-year-old trees than the use of shields containing wood. The anatomy of this is discussed.

109. GADŽIEV, T. JU.
Rootstocks and dates of budding for plums in the Voronež region. [Russian.]
Sad i Ogorod, 1957, No. 7, pp. 46-7.

When 3 European and 2 East Asian varieties of plum were budded on seedlings of European plums, cherry plum, sloe, and apricot, the highest percentage of take occurred on the cherry plum and the lowest on the sloe. The best date for budding onto cherry plum was between 18 and 25 August.

110. PAUNOVIĆ, S. A.
Wzajemne stosunki między zrazem i podkładka przy oczkowaniu śliwy odmiany Požegacza na siewkach różnych lokalnych śliw jugosłowiańskich i na *Prunus myrobalana*. (**Rootstock-scion interrelationships when budding the plum variety Požegača on seedlings of Yugoslav local varieties of plum and those of *Prunus myrobalana*.**) [English and Russian summaries 2 pp. each.]
Prace Inst. Sadown. Skierniewice, 1957, **2**: 121-9.

The growth of Požegača was studied during its first 3 years after budding on seedlings of 9 plum varieties and on *P. myrobalana*. *P. myrobalana* was found to be the most vigorous rootstock while others of interest were Ilinjača, Petrovača, Požegača and Belosliva. Detailed results are discussed and set out in charts. [For a similar study on apricot see *H.A.*, 27: 2118.]

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111. Hansen, C. J., Lowsbery, B. F., and Hesse, C. O.
Nematode resistance in plums.
Calif. Agric., 1957, **11**(10): 9, 13, illus.

Tests have shown that the clonal rootstocks Marianna 2623 and 2624 and Myrobalan 29, strains C, D, G and Sonoma, are immune or very highly resistant to both *Meloidogyne incognita* var. *acrita* and *M. javanica*. By contrast seedlings of the peaches Lovell, S-37 and Shalil were highly susceptible to *M. javanica* and those of Lovell were also susceptible to *M. incognita* var. *acrita*. —Univ. Calif., Davis.

Growth phenomena.

112. Passecker, F.
Versuche über den Einfluss des Baumschulstandortes und der Pflanzzeit auf das Gedeihen von Apfelbäumen am späteren Standort. **(Studies on the effect of nursery environment and time of planting on the growth of apple trees in subsequent environments.)**
Gartenbauwiss., 1957, **22***: 43-9, bibl. 3.

Observations with Klarapfel and Goldparmäne in 5 locations have shown no differences in growth or hardiness between trees from different nursery sources. When trees were transplanted from a mild to a mountain area, bud burst of autumn-planted trees was a fortnight later than that of spring-planted trees in the season of planting.

113. Vyvyan, M. C.
An analysis of growth and of form in young apple trees. I. Relative growth and net assimilation rates in 1- and 2-year-old trees of the apple rootstock-variety M.XIII.
Ann. Bot., Lond., 1957, **21**: 479-97, bibl. 16.

Two series (A and B) of one-year-old rooted stems were planted in consecutive seasons and samples were lifted at intervals of a few weeks over periods of one year (A) and two years (B) respectively. The weights at lifting, and their logarithms, were adjusted by covariance with the corresponding values at planting. Net Assimilation Rates, on the leaf-weight basis, showed values and a downward trend similar to those reported for cotton in the Sudan. The values on the bases of the arithmetic and geometric means were rather different and suggested different interpretations. The mean leaf-weight ratios, starting as nil each season, rose to a maximum, never exceeding 20%, by mid-summer. The Relative Growth Rates in the second season (B) started low and fell to a very low value; in the first season of both series they were low from the start—probably because of a check at planting. It is suggested that the low values of the R.G.R. found here and reported elsewhere for other woody plants, and the low leaf-weight ratios, are due largely to the presence of much residual tissue at the start of the season and that it is the leaf/(total-increment) rather than leaf/(total-weight) that is comparable to the leaf-weight ratio in annuals. It is pointed out, however, that other factors seem to be involved. [Author's abstract.]—E. Malling Res. Stat., Kent.

114. Smeets, L.
Some effects of temperature on the shoot growth of cherry seedlings. [Dutch summary 9 lines.]
Euphytica, 1957, **6**: 161-8, bibl. 8, illus.

First- and second-year seedlings of Limburgse Boskriek were grown at various day and night temperatures in natural daylength. Seedlings of both ages terminated their growth sooner at constant temperatures of 17° C. or 20° C. than at 23° C. or 26° C. The difference in duration of growth between 20° C. and 23° C. was greater in second- than in first-year seedlings. Only in second-year seedlings did night temperature affect the duration of growth of plants grown at a day temperature of 23° C. No effect of night temperature on the rate of growth was observed. [See also *H.A.*, 27: 1118.]—Inst. hort. Plant Breeding, Wageningen.

115. Dolgušin, D. A.
Emergence of a plum shoot on an apricot tree. [Russian.]
Lysenko, T. D.
Comments on the above note. [Russian.]
Agrobiologija, 1957, No. 2, pp. 44-6, illus., and 47-8.

In an Odessa garden a plum shoot emerged on a mature apricot tree 23 cm. above a branch of Italian prune budded on to it 7 years earlier. This phenomenon is illustrated photographically and schematically, and it is suggested that it was due to plastic substances from the plum graft passing into the apricot and initiating the formation of plum cells, then tissue, bud and finally the shoot. Lysenko concurs, and considers that it explains an earlier phenomenon of a hornbean-filbert tree found near Erevan.

116. Blommaert, K. L. J.
The significance of auxins and growth inhibiting substances in relation to winter dormancy of the peach tree.
Sci. Bull. Dep. Agric. S. Afr. **368**, 1955, pp. 23, bibl. 40, 4s. 3d. [received 1957].

Peach bud extracts were assayed during the dormant period (March to August), and were found to contain 4 growth promoting substances and an acid inhibitor. Three of the growth substances were IAA, indole-3-ethyl acetate (EtIA) and indole-3-pyruvic acid. The acid inhibitor occurred in the buds from early March to mid-June, followed by gradual disappearance until dormancy had been broken towards mid-August. The total amount of free auxin increased up to mid-June, then stopped, but was renewed during August, reaching a maximum with spring growth. It was shown that peach buds contain a precursor or bound form of IAA, and it is suggested that EtIA may be a reserve supply of IAA. These results indicate that winter dormancy of the peach bud is conditioned by the auxin/inhibitor ratio, and it is suggested that prolonged rest in the peach tree is caused by incomplete or delayed inactivation of the inhibitor as a result of insufficient cold during the critical months of June and July.—West. Prov. Fruit Res. Stat., Stellenbosch.

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117. MAURER, K. J.
Zur Frage des "primären" und "fertilen" Stadiums bei Apfelsämlingen. **(Investigations on the "primary" and "fertile" stages of apple seedlings.)** [English, French and Spanish summaries, 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 187-91, bibl. 15, illus.

Investigations showed that varieties, i.e. "mature" forms, tend to develop roots provided proper methods are used, but that some seedlings in the juvenile state would not form roots after earthing up. A method to shorten the sterile juvenile period or the primary state is described.—Geisenheim.

118. RUDLOFF, C.-F., AND FEUCHT, W.
Funktionelle Tendenzen der reproduktiven Organe des Apfels. 1. Beziehungen zwischen Anthese, Morphologie und Fruchtungsvermögen. **(Functional tendencies of the reproductive organs in apple. 1. The relationship between anthesis, morphology and fruiting ability.)**
Gartenbauwiss., 1957, **22***: 26-42, bibl. 21.

The characteristics of early- and late-flowering inflorescences were compared in 4 apple varieties. In general late-flowering inflorescences possessed longer axes and larger leaf surfaces than early-flowering inflorescences. Flower number was lower and stamens and ovules were fewer in late-flowering inflorescences. In the post-floral stage there was reduction in fruit set and in fruit weight from late-flowering inflorescences. These external variations are interpreted as changes in the plant from a reproductive to a vegetative phase.—Inst. Obstb., Landw. Hochsch., Hohenheim.

119. HAWKER, L. E., AND HAM, A. M.
Vesicular-arbuscular mycorrhizas in apple seedlings.
Nature, 1957, **180**: 998-9, bibl. 4, illus.

The formation of vesicular-arbuscular mycorrhizas in apple and strawberry seedlings grown in sterilized soil to which sporocarps of an *Endogone* sp. were added has been described by Mosse [*H.A.*, 26: 2534 and 27: 2125]. Hawker and others (*Trans. Brit. mycol. Soc.*, 1957, **40**: 375) have shown that a similar vesicular-arbuscular endophyte in roots of *Allium ursinum*, *Fragaria vesca* and other plants is a species of *Pythium* closely resembling *P. ultimum*. In the present paper an experiment is described in which apple seedlings were raised in sterilized soil inoculated with *Pythium* isolates from *Allium* and lettuce. When the fungus became established in apple the endophyte was strikingly similar to that described by Mosse for *Endogone*. Infected seedlings were also noticeably taller and sturdier than the uninfected control. To account for the similarity of effects of *Pythium* and *Endogone* it is suggested that either both these unrelated fungi assume the same form on entry into apple roots, or *Pythium* was present in or on the unsterilized sporocarps of *Endogone* used by Mosse.—Univ. Bristol.

120. GARJUGIN, G. A.
The rôle of deep vertical roots of fruit plants in utilizing ground water. [Russian.]
Agrobiologija, 1957, No. 2, pp. 125-7, bibl. 4.

Observations in mature orchards, with the watertable 15–20 m. below the surface, on the root systems of apricot, cherry, myrobalan, walnut, plum, mulberry and apple trees by means of 4 m. deep trenches confirmed the theory that long vertical roots utilized ground water. Tables are given showing root distribution in the soil profile.

121. RIEDHART, J. M., AND GUARD, A. T.
On the anatomy of the roots of apple seedlings.
Bot. Gaz., 1957, **118**: 191-4, bibl. 9, illus.

Differentiation in the apple [*Malus pumila*] root proceeds in an acropetal direction. Although vacuolation occurs in the metaxylem region first, this tissue is the last to mature. Sieve tubes are the first vascular elements to mature, followed by xylem. Thickenings occur on the radial and transverse walls of the cortical cells just outside the endodermis. These thickenings develop simultaneously with the first protoxylem elements. The phloroglucin-hydrochloric acid test indicated that they become lignified at the same time and to the same degree as the protoxylem elements. The layer of cells immediately outside the primary vascular tissue was designated as pericycle, and the next layer of cells as endodermis. Suberin lamellas develop on the walls of the cells of the endodermis. The deposition takes place at first in the cells outside the primary phloem poles and then proceeds toward the primary xylem poles. The number of xylem arcs which develop is not constant but appears to be correlated with the diameter of the root. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

122. KOVALEV, N. V., AND SABIROV, M. K.
Root-grafting in fruit plants. [Russian.]
Bot. Žurnal, 1957, **42**: 1286-8, illus.

Natural root grafts were found at Taškent to occur in 3–5% of apple seedlings of 5 varieties. Five types of grafts were observed and are here briefly described and illustrated.

Pollination.

123. HŁYŃ, M.
Wpływ mieszanin pyłkowych na uzyskanie mieszańców. **(The influence of pollen mixtures on the production of hybrids.)** [English and Russian summaries ⅓ p. each.]
Arbor. Kórnickie, 1956, **2**: 247-57, illus.

From 1951 to 1955 the cherry varieties Drogan Yellow Bigarreau and Lyons were cross pollinated with pure and mixed pollen of species of *Cerasus*, *Armeniaca*, *Persica*, *Amygdalus* and *Padus* [themselves now species of *Prunus*] to investigate the possibility of hybridization and the effect of various pollen components on the morphological and physiological properties of the hybrid seedlings. The results are tabulated and the morphological characters of the hybrids are described.

124. SOKOLOVA, E. P., AND ŽALNIN, V. S.
The influence of the age of the pollinated flower on the hybrid progeny of an apple tree. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 429-30, bibl. 5.

Young, mature and old flowers of the apple variety

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Pepin Šafrannyj were pollinated by the variety Nedzvedskyj, which contains red pigment in all its organs. Observations on the pigmentation of young F_1 plants showed the paternal influence to be stronger in seedlings from the young and old flowers than in those from mature flowers.

125. Carlone, R.
Influenza del diverso momento d'impollinazione sull'allegagione e sulla crescita del tubulo pollinico nel melo Golden Delicious. **(The effect of exact time of pollination on set and growth of pollen tube in Golden Delicious apple.)** [English and French summaries.]
Reprinted from *Genet. Agrar.*, 1956, Vol. **6**, pp. 16, bibl. 18.

Pollination was carried out before and during anthesis and with a fully open flower. Final results showed the earliest treatment to be best. There was but little difference in actual setting achieved, however, which indicates that pollination occurs over quite a long period, viz. from 3 days before to 3 days after flowering. Observations on pollen tube growth confirmed these results and except at the outset the rate of tube growth was the same at all three stages and affected pollination in about 72 hours.—Ist. Colt. arb. Turin.

Spraying for cultural purposes.

126. Abbott, D. L.
Growth substances as fruit-thinning agents for apples: progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 57-60, bibl. 1.

Aqueous sprays of 25 and 50 p.p.m. of naphthaleneacetamide were applied to branches of Miller's Seedling, Lord Lambourne, Crawley Beauty, Worcester Pearmain, Lane's Prince Albert and Laxton's Superb 2-4 days after petal-fall. All varieties were thinned by the sprays, Laxton's Superb and Miller's Seedling being the least and Crawley Beauty and Lane's Prince Albert the most responsive to treatment. Thinning tended to be more severe on the smaller fruits and Crawley Beauty was the only variety to show an increase in large fruits. The biennial habit of Laxton's Superb was unaffected, but spraying had a marked effect on that of Crawley Beauty. Branches of Crawley Beauty that had been sprayed at 25 p.p.m. in 1955 carried a crop of marketable fruit approximately three times that of the control branches in 1956.

127. Pieniążek, S. A., Soczek, Z., and Cegłowski, S. M.
Walka z przemiennym owocowaniem jabłoni. **(Control of biennial bearing in apple trees.)** [English and Russian summaries 1 p. each.]
Prace Inst. Sadown. Skierniewice, 1957, **2**: 107-19, bibl. 8.

Work on this problem has been in progress in Poland since 1947. As a thinning agent in on years 0·1-0·2% Nitrocresol, in spite of some leaf scorch, is recommended for the variety Antonovka. On other varieties 20-40 p.p.m. NAA, applied not later than 2 weeks after flowering, was the most effective. A combination of thinning and cover sprays (lime sulphur or bordeaux with calcium arsenate) did not impair the activity of the thinning agent.

128. Øhlers, H.
Forsøg med forebyggelse af frugtfald på aeble ved sprøjtning med plantehormoner. **(Experiments on the control of fruit drop in apples by spraying with plant hormones.)**
Tidsskr. Planteavl, 1957, **61**: 507-28.

The following results were obtained from trials carried out at Lyngby from 1945 to 1953: I. *Pre-harvest drop sprays:* For all varieties and hormone preparations, premature fruit drop in apples was reduced from 21% to 11%. II. *June drop sprays:* Variable results and great differences in varietal response made it difficult to ascertain whether growth substance treatment is advantageous under Danish conditions.

129. Richards, R. R.
Apricot hormone spray trials—progress report.
Tasm. J. Agric., 1957, **28**: 278-87, bibl. 6, illus.

From the results of 2 seasons' trials it is concluded that it is possible to increase the yield and reduce fruit drop of Moorpark and Trevatt apricots by applying the triethanolamine salt of 2,4,5-trichlorophenoxypropionic acid at the beginning of pit hardening. Leaf and shoot damage was more severe on trees sprayed with 50 p.p.m. than on trees sprayed with 25 p.p.m.
J.R.L.

130. Crane, J. C., and Warner, R. M.
Producing "seeded" Calimyrna figs by spraying with a growth regulator.—A progress report.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 18-19.

In 2 similar spraying trials 2 concentrations of each of the following were applied: sodium benzothiazol-2 oxyacetic acid, butyl-2 benzothiazolyloxyacetate and butyl-2 benzothiazolyloxyacetate+Nugreen. Observations made at intervals throughout the season indicated that none of the treatments (except perhaps the higher concentration of the combination spray) produced crops of parthenocarpic figs equal to the crops produced by trees that were caprified. However, satisfactory crops were produced by all 4 treatments involving the acetate formulation. J.R.L.

Nutrition and soil management.

(*See also* 53, 170, 180q, u, x, 970.)

131. Baxter, P.
Fertilizer trials on apple and pear orchards in Southern Victoria. Parts 1 and 2.
J. Agric. Vict., 1957, **55**: 351-9, bibl. 1, illus.; 487-97, bibl. 2, illus.

The basic treatments applied to 3 fertilizer trials laid out in 1936 in commercial apple and pear orchards were: complete fertilizer (2 : 2 : 1), N only, and no fertilizer. The fruit yield from all trees not receiving a complete fertilizer was progressively reduced until after 20 yrs. the trees receiving N only or no fertilizer were bearing only half as much as the trees receiving a complete fertilizer. After 10 years the application of K to some trees gradually restored the declining yields until they equalled those from trees receiving a complete fertilizer. Applications of Ca or Mg affected the cropping adversely. Growth was most vigorous on trees receiving a complete fertilizer, there being no significant difference between the other treatments. Trees which received K bore the largest apples, but colour was best on fruit from trees receiving no fertilizer and poorest on trees receiving N only. Trees which received no K were severely infected with *Polystictus* and *Stereum*, which were almost entirely absent from trees receiving a complete fertilizer. Leaf analyses showed that the K content was lowered by soil applications of N, Mg or Ca, while the Mg content was lowered by soil applications of Ca or K. The sum of the cations Ca^+, Mg^+, and K^+ remained nearly constant under wide changes of the nutrient status of the tree. The leaf-N content did not change appreciably despite large changes in the amount of N applied.

J.R.L.

132. Trzcinski, T., and de Munter, P.
Étude de l'influence de la fumure sur la composition chimique et certains caractères physiques des feuilles du pommier. **(A study of the effect of manuring on chemical composition and certain physical characters of apple leaves.)**
Bull. Inst. agron. Gembloux, 1957, **25**: 212-52, bibl. 8.

More detailed results are given from a manurial pot trial with apples [see *H.A.*, 26: 208]. Phosphorus in the fertilizer was related to leaf contents of P, K and Ca. There were indications that high K in the fertilizer reduced twig diameter, while leaf size was increased by P. Leaf size was dependent on leaf contents of K_2O and CaO. Twig extension growth was not related to leaf composition. Twig diameter was related to leaf contents of N and K. Leaf analyses have shown that leaf N controls the contents of K, Na and Mg. Leaf P contents were inversely proportional to K contents. Leaf K controlled leaf contents of Na, Ca and Fe. Other interrelationships observed were Na/Mg, Ca/Fe, and Mg/Fe.

133. Dotti, F.
Perfezionare la concimazione delle piante da frutto. **(Improving the manuring of fruit trees.)** [French, English and German summaries 6 lines each.]
Frutticoltura, 1957, **19**: 337-41.

Optimal values for foliar N, P and K in peaches are discussed in relation to maximal production, with emphasis on the particular importance of N. [See also *H.A.*, 27: 139.]

134. Collins, W. B.
Influence of nutrition on apple storage quality.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 2.

When varying rates of N, P and K were applied to McIntosh apple trees the most significant results were obtained with N. As the N levels in the tree were increased the colour and keeping quality of the fruit decreased. Firmness, estimated by pressure test, dropped an average of 0·2 lb. for every 0·1% increase in N level. The yield and size of fruit increased with increases in N level. Optimum levels of N in the tree appeared to be between 1·9 and 2·1%. Trees accumulated more N when this was applied in combination with P and K than when it was applied alone.—Exp. Fm, Fredericton, N.B.

135. Lalatta, F.
Considerazioni sull'impiego dei concimi fogliari. **(Observations on the use of foliar nutrients.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 407-12.

A proprietary foliar fertilizer containing 20% N, 10% P_2O_5, 18% K_2O, 1% MgO and unspecified amounts of trace elements, was recommended for use at 0·5–0·6%. Experiments showed that at 1% it was non-toxic to 20-year-old apple, 12-year-old pear and 4-year-old peach trees. At 1·5% slight burns appeared on pear leaves and at 2% all 3 types were affected, the damage being greatest in pear and least in apple. A 2·5% application before bud burst to 10-year-old apple trees had no demonstrable effects, but subsequent 0·5% treatments, 1 before and 4 after flowering, improved vegetative growth and leaf colour by mid-June and finally increased fruit size, particularly in Jonathan. In 2-year-old apple trees no visible effects resulted from 2 June treatments at 0·5%, but leaf analysis showed higher values for N and K in treated than in untreated leaves, the latter showing sub-optimal contents of these nutrients. The P content, already relatively high, was not increased by foliar fertilizing.

136. Bowen, T. J.
Urea sprays in deciduous fruits.
Qd agric. J., 1957, **83**: 259-62, illus.

On trials carried out over 3 years the use of urea foliage sprays was compared with standard fertilizer schedules on pome fruits. There was often a quick response to urea in leaf colour and fruit set if the trees were showing N-deficiency symptoms, but the only difference in tree growth occurred in one season when an increase in terminal growth was recorded on Delicious and Granny Smith trees and a decrease in terminal growth on Jonathan trees receiving urea sprays.

J.R.L.

137. Warner, R. M., and Proebsting, E. L.
Zinc and manganese sprays for figs.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 11-17.

During 1955–56 foliage sprays of zinc chelate, potassium hydrogen phosphate, zinc sulphate+lime, zinc+manganese chelates or iron chelate were applied to plots in an Adriatic and Calimyrna fig orchard. The average twig growth in both years was greater on all the treated plots than on the control. The percentage of rotten fruit was slightly lower on the control trees than on the treated ones. In 1956 four out of five treated plots yielded heavier fruit than the control. Leaf analyses showed that of the materials used Zn was the most readily absorbed; they gave no evidence of the absorption of K and confirmed earlier findings that P is readily absorbed. In all cases there appeared to be less migration of the elements out of the leaves between sprays in the Adriatic than in the Calimyrna fig.

J.R.L.

138. **Weeks, D., and Snyder, J. H.**
Soil variables for use in economic analysis.
Hilgardia, 1957, 26: 497-520, bibl. 18.

As a preliminary step in evaluating the economic benefits derived from soil conservation practices in Yellow Newton apple orchards in the lower Pajaro Valley of Santa Cruz County, California, it has been necessary to express physical soil productivity quantitatively in terms of a minimum number of variables. To achieve this a graphical analysis has been made of the functional relationships existing between certain soil characteristics and yields of apples per acre [see also *H.A.*, 27: 150]. From the preliminary results reported here it is concluded that the percentage by weight of surface soil particles 5 microns or less in diameter, or the corresponding moisture equivalent, may be used as a fairly reliable representation of the more important surface soil characteristics within the area under investigation. Similarly, a sufficiently accurate expression of profile characteristics may be obtained by using factor A of the Storie soil-rating index (Storie, R. E., Revision of the soil-rating chart [*Processed Publ.*] *Calif. agric. Exp. Stat.*, 1948). About 44% of the variations in tree yields could be accounted for by variations in these two measurements and in tree age.—Univ. Calif., Davis and Berkeley.

139. **Dalbro, S.**
Jordbundsanalyser i frugtplantager. **(Soil analyses in orchards.)** [English summary 1½ pp.]
Tidsskr. Planteavl, 1957, **61**: 445-73, bibl. 24.

Results are presented of soil investigations performed in apple orchards at the state experiment stations of Blangstedgaard and Hornum and in private orchards in Fuenen. The soil analyses show that exchangeable K is generally accumulated to a very high degree in the top 0–10 cm. layer; the K content begins to decrease in the next 10–20 cm. layer and abruptly decreases in the layers 20–40 and 40–60 cm. The highest content of exchangeable K was found near the trunks of the trees and the lowest between the rows, the content beneath the tree crowns being intermediate. The establishment of a permanent grass sward in the orchard enhanced the accumulation of K in the top layer, as the grass extracted K from the deeper layers, which was eventually deposited in the surface soil as the grass was mowed and left on the ground. The total amount of exchangeable K in the investigated soil profile 0–60 cm. was not altered. Continued straw mulching increased the difference in K content between top and subsoil considerably. This may partly be explained by the effect of the straw mulch on the K-fixing properties of the soil resulting from protection of the surface from frequent drying and wetting. The P content was generally found to be highest in the top soil and lowest in the 20–40 cm. layer. Permanent grass had no influence on the distribution of P in the soil profile. The root investigations showed the apple trees to be shallow-rooted. At Blangstedgaard the roots extended from a depth of 14·4±1·5 cm. to 52·8±1·5 cm. The investigation comprised 30 23-year-old trees of the variety Mère de Menage on rootstock M IV. The trees at Hornum were equally shallow-rooted. In orchards where the soil was cultivated very few roots were found in the top soil. The establishment of a grass sward or continued straw mulching favoured root growth in the top layer. Apple varieties or rootstocks had no influence on the nutrient content of the soil. It is concluded that full information on the fertilizer status in the orchard is only obtainable when the soil is analysed in different horizons down to a depth of 60–80 cm.; but for practical purposes soil sampling in two depths, 0–20 cm. and 20–40 cm., is recommended. [From author's summary.]

140. **Löhrke, L.**
Untersuchungen zur Frage der Mischkultur im Obstbau. **(Research on the problems of mixed culture in the orchard.)** [Russian and English summaries 14 and 16 lines respectively.]
Arch. Gartenb., 1957, **5**: 3-26, bibl. 10, illus.

From 1952 to 1955 three different rotations of crops were grown in a standard apple orchard, planted in 1947. Soil moisture, increase in trunk circumference and yield of crops were examined. The soil moisture measurements showed that all the crops competed with the fruit trees for water during the months of May, June and July. Injury to the fruit trees was prevented by leaving fallow a 3-metre wide strip of soil along the tree rows. The crop had little or no effect on trunk circumference. Only in the apple variety Goldparmäne was there a correlation between increase in trunk circumference and the type of intercrop, the effect of the latter on trunk circumference being felt in the following year only.—Inst. Obstb. Obstzücht. Marquardt b. Potsdam.

141. **Proebsting, E. L., Jr.**
Yakima Valley peach experiments.
West. Fruit Gr, 1957, **11**(11): 22-3.

The effects of several forms of soil management are being studied with Elberta peach and the results from the first 5 years are given. The treatments were winter cover crops with clean cultivation, alfalfa and orchard grass permanent cover crops, and sod mulch; all treatments received 5 levels of N. Yields were related to N availability, but the best results were given by mulch treatment. High N levels generally resulted in later fruit maturity. Permanent cover crops reduced production, but clean cultivation resulted in good growth and fruit production with, in general, early maturity. Peaches grown with an alfalfa cover matured very late. [See also *H.A.*, 27: 3145.]—Irrig. Exp. Stat., Prosser, Wash.

142. **Bould, C., and Jarrett, R. M.**
Cover crops in relation to soil fertility and tree nutrition: II. An experiment with dessert bush apple trees: Progress report I.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 76-84, bibl. 6, illus.

In 1955 all cover crops caused a considerable reduction in leaf N of both apple varieties (Cox and Worcester Pearmain) as compared with corresponding trees under arable cultivation, the reduction being least on Cox under "tumble down" grass treatment. In 1956 timothy and rye grass reduced still further the leaf N status, despite additional supplies of fertilizer N, but there was a suggestion that the clover was making an effective contribution to the available soil N. Additional supplies of fertilizer N had no significant effect on the leaf N status of Worcester Pearmain trees but raised significantly that of Cox's Orange Pippin trees. This relatively small response to fertilizer N points to the value of the urea foliar spray method for maintaining adequate levels of N during the first and second seasons after grassing down orchards. It appears that in addition to available N available P was released under the clover crop during 1956, but leaf K levels were lower in trees on clover plots than in trees on grass plots. There is little doubt that the striking effects were due partly to the dry period in 1955, which reduced the N reserves in the trees, partly to the early dry months in 1956, and also to the competitive effects of the grass covers for water and N.

143. Anon.
Straw mulching brought bigger fruit.
Grower, 1957, **48**: 526-7, illus.

Figures are given showing increases in shoot growth and fruit size on young apple trees as a result of straw mulching along the rows over a grass sward.

144. Benedict, W. D.
Effect of supplemental irrigation upon the nitrogenous composition of leaves and stems adjacent to the fruit and upon fruit size and quality of the Jonathan apple.
Diss. Abstr., 1957, **17**: 1178, being *Publ.* 21,423 of 111 pp.

Leaf, stem and fruit samples were taken from Jonathan trees grown in grass or mulch covers with or without irrigation. Irrigation applications did not significantly affect the N composition of leaf and stem samples in comparison with no irrigation. The rate of fruit growth and average weight per fruit were more closely related to the total amount of fruit on the tree than to soil moisture conditions. Fruit storage life and chemical composition were not affected by small changes in soil moisture above wilting percentage. The total N content of median and cluster base leaves decreased from July to September, while the total N content of one year wood and secondary shoots increased. Leaf samples contained 3 to 4 times the amount of amino acids found in woody tissues, while the amide content of one-year-old wood and secondary shoots averaged 3 or 4 times the leaf content. Cluster bases contained nearly 5 times the amount of amides found in other woody tissues. Nitrogen resistant to hydrolysis was higher in leaves than in woody samples. The content of hydrolysable N in the cluster bases was 2 to 3 times the amount found in other woody tissues.—Ohio St. Univ.

145. Patron, A., and Swinzow, H.
Influence de l'irrigation dans la maturation des abricots Canino. (Note complémentaire.) **(Effect of irrigation on ripening of Canino apricots. (Additional note.).)**
Fruits d'Outre Mer, 1957, **12**: 314-16, bibl. 1.

Studies on colour, firmness, composition and canning quality are reported from Morocco for apricots irrigated until 9, 16 or 25 days before harvest date. The earlier irrigation ceased, the earlier did the fruit ripen. Colour differences were enhanced by canning. By staggering the cessation of irrigation the season of harvesting could be prolonged by several days. [See also *H.A.*, 27: 1153.]

146. Prosser, T. W., and others.
Precision in irrigation.
West. Fruit Gr, 1957, **11**(4): 17-19, illus.

Notes are given on the use of the tensiometer, of electrical resistance equipment and of the atmometer in irrigation of fruit plantations, and on irrigation without special equipment.

147. Hilkenbäumer, F., and Heiber, H.
Der Einfluss unterschiedlicher Ausnutzung auf die Betriebskosten von Maschinen und Geräten im Obstbau. **(The effect of utilization on the working cost of machines and implements in fruit growing.)**
Reprinted from *Dtsch. GartenbWirtsch.*, 1956, Heft 9, pp. 4, bibl. 3.

Data on the working cost of tractors, spraying machines and implements for soil cultivation in relation to their utilization.

Other cultural practices.

148. Guidorzi, C., and others.
[Pruning of fruit trees.] [In Italian.]
Frutticoltura, 1957, **19**: 588-606, illus.

Italian pruning methods are illustrated and discussed in 4 articles, viz.: *Pruning for production in fruit trees* (C. Guidorzi), dealing with apple, pear and peach; *Winter pruning of fruit in the southern regions* (D. Scaramuzzi), referring to almond, vine, olive and citrus in very general terms; *Winter pruning in Campania* (V. Forte), dealing with peach and apple; *Winter pruning of fruit trees in Sicily* (P. Spina), dealing with citrus, almond, olive, vine and pistachio.

149. Harris, W. B.
Thinning Wight Cling peaches.
J. Dep. Agric. S. Aust., 1957, **61**: 9-11, illus.

In a replicated trial the crop from Wight Cling peach trees on which the fruit was thinned to 90, 75, 60, 45 or 30 fruits per inch of butt circumference was compared with that from unthinned trees. The highest total yield and the highest yield of fruit of canning quality was obtained on trees thinned to 90 fruits per inch of butt circumference. Thinning to between 60 and 90 fruits produced the same total yield as when the fruit was not thinned, but the yield of quality fruit was improved. Thinning to 30 fruits per inch of butt circumference reduced both the total yield and the yield of canning quality fruit. J.R.L.

150. Lalatta, F.
Diradamento dei frutticini e nutrizione potassica del pesco. **(Fruit thinning and potassium nutrition of peach trees.)** [French, English and German summaries 6 lines each.]
Frutticoltura, 1957, **19**: 351-5.

Leaf analysis figures for N, P and K are compared over a 4-year period for peach trees hand-thinned early in the season and for others not thinned. In most instances thinning increased leaf K and caused little or no reduction in total yield. Thus K fertilizing can be reduced where early thinning is practised.

Composition of leaves and fruit.

(*See also* 14, 43, 180a, b.)

151. Bielińska, M. J.
Zawartość azotu i węglowodanów w liściach i pędach jabłoni przemiennie owocujących. **(The content of nitrogen and carbohydrates in the leaves and shoots of biennial bearing apple trees.)** [English and Russian summaries 1 p. each.]
Prace Inst. Sadown. Skierniewice, 1957, **2**: 223-32, bibl. 9.

Results of a 5-year study on the differences in N and carbohydrate contents during on and off years in the apple varieties Bohnapfel, Fameuse, Wealthy and Antonovka are given. The total N in the leaves and shoots, especially fruiting spurs, was higher during on years, but the protein N in the fruiting spurs was higher in off years. Differences in carbohydrate content were not significant. It is suggested that a close relationship exists between fruiting and N metabolism of fruit trees.

152. Bollard, E. G.
Composition of the nitrogen fraction of apple tracheal sap.
Aust. J. biol. Sci., 1957, **10**: 279-87, bibl. 16.

Organic nitrogenous compounds accounted for most of the nitrogen present in apple tracheal sap, aspartic acid, asparagine and glutamic acid being quantitatively the most important compounds. Glutamic and other amino acids were also present as well as a peptide-like substance. While apple variety, rootstock or manurial treatment may have had effects on level of nitrogen in tracheal sap, they seem to have had little effect on proportion of nitrogenous compounds present. The composition of soluble nitrogen fraction of leaves and fruits showed distinct differences from the composition of tracheal sap. [From author's summary. See also *H.A.*, 27: 11.]

153. Poapst, P. A., and Ward, G. M.
Starch content in relation to maturity in McIntosh apples.
Abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 3.

Five years' observations of natural drop and starch changes at harvest time on a single McIntosh tree suggest that the relation between these 2 factors varies in a manner proportional to prevailing temperatures at and around harvest time. Specifically, the number of days separating the date of complete starch hydrolysis and the date of a weighted mean condition of abscission appears to be proportional to the average temperature prevailing from the beginning of starch hydrolysis to the date of 90% drop.

154. Ulrich, R., and Thaler, O.
Variations quantitatives et qualitatives de quelques constituants glucidiques, acides et azotés de la poire Williams, au cours de son développement. **(Quantitative and qualitative changes in certain glucidic, acid and nitrogenous constituents of Williams pears during their development.)**
J. Agric. trop. Bot. appl., 1957, **4**: 12-30, bibl. 73.

The changes were recorded during growth, at harvesting and during cold storage and subsequent maturation. They are shown clearly in graphs and tables and include individual and total sugars, protein fixed acidity, soluble N, individual organic acids and free amino acids.

155. Reynolds, T. M.
Water soluble constituents of fruit. VI. The amino acids in apricots and peaches.
Aust. J. Chem., 1957, **10**: 198-202, from abstr. in *C.S.I.R.O. Sci. Index*, 1957, **5**, No. 409.

The amino acids in apricots and peaches were fractionated by displacement chromatography on columns of cation-exchange resins and then examined by paper chromatography. The same 18 amino acids were identified in both species. Except for a much lower concentration of proline in peaches the amino acids were present in similar proportions in the two species.

156. Thaler, O., and Rateau, J.
Veränderungen des Zuckers, der organischen Säuren und der Aminosäuren bei Kirschen im Verlauf des Wachstums und der Reife am Baum. **(Variations in the sugars, organic acids and amino acids of cherries during growth and ripening on the tree.)** [English, French and Spanish summaries 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 191-6, bibl. 20.

Adopting the method used in the analysis of the sugars, organic acids and amino acids during the growth and ripening of Williams pear, the cherry variety Napoleon Bigarreau was similarly examined. While certain similarities can be seen, differences are more obvious.—Lab. Biol. veg. Stat. Froid, Bellevue (S. & O.).

157. Freytag, H. E., and Blasse, W.
Zur Farbstoffausbildung einiger Süss- und Sauerkirschensorten. **(Pigment formation in some sweet and acid cherry varieties.)** [Russian and English summaries 10 lines each.]
Arch. Gartenb., 1957, **5**: 47-61, bibl. 2, illus.

The development of pigment formation (anthocyanins) was examined with the Pulfrich photometer. With sweet cherries the first measurements showed a flattened curve which gradually developed into a maximum. While the sweet cherry curves were characterized by flatter and broader absorption curves, the acid cherries showed a more outstanding maximum. Typical for the different kinds was the different increase in colour intensity during fruit development. When overripe, the colour intensity decreased.—Inst. Acker- u. Pflanzenb. Müncheberg/Mark.

158. Tomaszewska, E., and Tomaszewski, M.
Witamin C w liściach i owocach niektórych drzew i krzewów. **(Vitamin C in the leaves and fruit of some trees and shrubs.)** [English and Russian summaries ¾ p. each.]
Arbor. Kórnickie, 1956, **2**: 219-33, bibl. 32.

The ascorbic acid content and ascorbic acid oxydase and polyphenol oxidase activities of the leaves of pear, cherry, apricot and peach trees were determined at intervals during the growing period. While the ascorbic acid content was in general highest in midsummer and lowest at the end of the vegetative period, there were marked differences in its maximum : minimum ratio between the various species, related to differences in enzyme activity. Pear and cherry showed a high ratio and high enzyme activity, and apricot and peach a low ratio and low enzyme activity. It is suggested that these differences are due to the shorter vegetative period and better adaptation to winter of the pear and cherry. The maximum, minimum and average vitamin C contents are given of the fruits of several varieties of cherry, plum, apricot and quince, species of *Berberis* and *Cornus* and *Schizandra chinensis* and *Rosa rugosa*.

159. TOMASZEWSKA, E., AND TOMASZEWSKI, M.
Skład chemiczny owoców derenia jadalnego (*Cornus mas* L.) i derenia japońskiego (*Cornus officinalis* Sieb. et Zucc.). (**The chemical composition of the fruits of the edible *Cornus mas* and *C. officinalis*.**) [English and Russian summaries 7 lines each.]
Arbor. Kórnickie, 1956, **2**: 239-41, bibl. 5.

Results of physical and chemical analyses are given. The average vitamin C content of *Cornus mas* was 133·1 mg./%, that of *C. officinalis* 81·5 mg./%.

Harvesting.

(*See also* 63, 180j.)

160. KRIJGSMAN, H. K., AND DE RUITER, J.
Een werkstelling voor het plukken van fruit. (**A work platform for picking fruit.**)
Fruitteelt, 1957, **47**: 826-8, illus.

The man-hours required for picking apples have been reduced by the use of a wooden platform supported by a metal framework 1·80 m. high. Both hands are free for picking, and the fruit can be put directly into the boxes.

161. MCBIRNEY, S. W.
Bins aid in mechanization.
West. Fruit Gr, 1957, **11**(10): 43, illus.

After transport from orchard to warehouse Delicious apples in standard boxes showed more minor bruises than fruit in 38 in. deep bulk bins.

162. LEVIN, J. H., AND GASTON, H. P.
A bulk box dumper for handling fruit.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 557-62, bibl. 1, illus.

A mechanical bulk box dumper is described which the authors consider will handle up to 200 bushels of apples an hour, causing less bruising than when field crates are emptied manually. It is simple in construction and easy to operate. J.R.L.

Storage.

(*See also* 42, 180s, 181b, c, e, h, 311, 328, 1010.)

163. FRUITS D'OUTRE MER.
Le froid et les fruits. (**Refrigeration and fruit.**)
Fruits d'Outre Mer, 1957, Vol. **12**, Nos. 4 & 5, pp. 135-234, bibls, illus.

The whole of this special issue is devoted to the cold storage of fruit and the use of refrigeration in transport and processing. Review articles of special interest include the following: "Some aspects of the physiological reactions of fruit to cold storage", by R. Ulrich. "A serious cold-storage disorder of apples and pears: scald", by P. Marcellin and C. Leblond. "Behaviour of citrus during cold storage", by P. Ildis. "Fruit rots and storage conditions", by C. Moreau. "Physiological responses of banana to low temperature in the pre-climacteric phase", by R. Deullin. "The economic importance of refrigeration in fruit storage and transport", by J.-B. Verlot. "Refrigerated sea transport of bananas from the French colonies", by R. Deullin. "Refrigerating installations for fruit storage: technical and economic problems", by A. Gac and M. Anquez.

164. DEWEY, D. H., BALLINGER, W. E., AND PFLUG, I. J.
Progress report on the controlled-atmosphere storage of Jonathan apples.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 691-700, bibl. 10, illus.

Experiments during 1954–56 have shown that the outstanding advantage of controlled-atmosphere [gas] storage for Jonathan apples is the prevention of Jonathan spot and soft scald, which are serious diseases of fruit in cold store. After 7 months' storage in controlled atmosphere satisfactory eating quality was retained and the fruit subsequently remained free from mealiness when kept at room temperature longer than fruit from ordinary [cold] stores. The trials have shown that Jonathan apples can be stored from harvest until the following May in controlled atmospheres of 2·5–5% CO_2 and 3% oxygen at 32° F.
J.R.L.

165. PHILLIPS, W. R.
Controlled atmosphere storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 7.

The following observations were made over 2 years on the performance of McIntosh apples in commercial gas storage: (1) When scald occurred it was largely confined to poorly coloured apples. (2) There tended to be more scald on fruit from high N orchards. (3) The slow reduction of O_2 concentration to the desired level of 3% appeared to be contributory to the occurrence of scald. (4) Grading before storage increased bruise breakdown; this form of breakdown advanced faster in gas than in normal storage. (5) The use of an independent scrubber connected into the principal air distribution and cooling system appeared to be more satisfactory than the Carrier method of drenching the cooling coils with caustic.—Centr. exp. Fm, Ottawa.

166. EAVES C. A.
The removal of carbon dioxide from controlled atmosphere storages.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 7.

A review of the development of scrubbers for carbon dioxide, both for small-scale experiments and for commercial use, is presented, together with descriptions of two devices developed at Kentville. One of these is based on the venturi principle and the other is similar to that now in commercial use in England. Consideration is given to the use of sodium hydroxide and calcium hydrate as absorbents. It is concluded that calcium hydrate is satisfactory and much more economical under local conditions.—Exp. Fm, Kentville, N.S.

167. Phillips, W. R.
Storage in polyethylene containers.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, pp. 5-6.

With McIntosh apples stored in polythene-lined containers, little scald occurred at 32° F. but at 40° F. scald was pronounced and in inverse proportion to the number of liner perforations. Very little core flush occurred at 40° F. but a considerable amount at 32° F., incidence being greater in the perforated liners. Flavour and texture were improved by polythene liners at 40° F. but were very little affected at 32° F. Moisture loss was considerably reduced by the liners. The gas mixture produced in the liners at 40° F. was within the margin of safety but that produced at 32° F. caused risk of damage. Carrots stored in polythene-lined containers at 36° F. kept very well and did not develop any taint. In a storage atmosphere of over 80% R.H. perforated and non-perforated bags controlled moisture equally well. Storage of celery at 32° F. was better with polythene liners than without.—Centr. exp. Fm, Ottawa.

168. Loewel, E. L.
Ergebnisse von Lagerversuchen mit Äpfeln in verschiedenen Lagertypen und mit verschiedenen Sorten. **(Results of storage trials with apples in different types of store and with several varieties.)**
Mitt. ObstVersuchsringes Jork, 1957, **12**: 126-40, bibl. 6, illus.

The behaviour of the most important apple varieties in the lower Elbe plain was studied in 3 types of store. It is concluded that pruning and manuring are of primary importance for storage quality. The ascorbic acid content of the fruit appears to be related to storage quality. The need to pick at the correct time is emphasized. Cool stores, especially with an air scrubber, always gave good results, while gas storage was good with certain varieties.

169. Porritt, S. W., and Fisher, D. V.
Effect of pre-storage treatment and methods of storage on keeping life and quality of Golden Delicious.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, pp. 2-3.

Little yellowing occurred at cold storage temperatures, but fruit classified as yellow at harvest coloured satisfactorily when brought from cold storage to 70° F. Fruit stored in polythene required longer to colour. Fruit classified as green at harvest failed to colour satisfactorily following cold storage even after 10 days at 70° F. Pre-storage conditioning of green fruit at 55° F. for 8 days or more caused fruit to colour fairly well, but none of the fruit classified as green at harvest ripened with satisfactory quality and flavour.—Exp. Fm, Summerland, B.C.

170. C.S.I.R.O., Australia.
Fruit investigations.
A.R. C.S.I.R.O., 1955–56, 1956, p. 25.

Physiology of apple fruits in relation to storage disorders: Nitrogen applied as urea sprays was found to accumulate as protein and soluble N, the latter increasing faster. These increases had no effect on respiration at picking time. The influence of N on storage disorders operates mainly through its effect on size. Leaf sprays of P and K had no effect on fruit content. Seed number had no effect on keeping quality. *Gas storage:* Low O_2 concentrations in the absence of CO_2 have allowed the use of low storage temperatures without increasing susceptibility to low-temperature breakdown. These conditions have given good control of softening, have reduced wastage from disorders and rots and have markedly reduced the proportion of soluble pectin. *Diphenylamine treatment for apple scald* gave greater control of the disorder than any existing treatment and could be combined successfully in the first wrap. *Apple rootstock trials:* With both Jonathan and Granny Smith vigour was greater on M.XII than on Spy rootstocks; with Jonathan total crop was largest on M.XII, whereas with Granny Smith it was largest on Spy. *Pear rootstock trials:* Vigour of Williams was greater on the clonal pear selections 1, 7 and 8 than on Kieffer seedling stocks.

171. Padfield, C. S.
Should Hawke's Bay-grown Sturmer apples be cool-stored at 35° or 38° F.?
Orchard. N.Z., 1957, **30**: 31-3, bibl. 3.

Storage tests showed that Sturmer apples from the Hawke's Bay area were more susceptible to breakdown at 34–35° F. than at 37–38° F., therefore the higher temperature is recommended for their storage.

172. Poma Treccani, C.
Disfacimento da bassa temperatura delle mele Abbondanza: analisi delle cause determinanti. **(Low-temperature breakdown of Abbondanza apples: analysis of the underlying causes.)**
Frutticoltura, 1957, **19**: 443-50, bibl. 6, illus.

There is considerable evidence that apple varieties such as Abbondanza, which are susceptible to low-temperature breakdown [see *H.A.*, 27: 172], should be harvested and cold-stored earlier than normally, i.e. before the green colour begins to change to yellow and respiration approaches its maximum.

173. Phillips, W. R., and Poapst, P. A.
The influence of seeds on core flush.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, pp. 3-4.

Experiments indicated that core flush in McIntosh apples was associated with seed vigour and vernalization. In fruit stored at 50° F. for up to 33 weeks no core flush developed and seeds did not germinate when placed in Petri dishes. Storage at 40° F. only resulted in a significant proportion of core flush after 33 weeks, and a small proportion of seed germinated after 18½ weeks. In apples stored at 35° F. core flush and seed germination occurred after 8 weeks and continued to increase until the end of storage. At 30° and 32° F. neither core flush nor seed germination occurred until after 18½ weeks, but thereafter they increased rapidly. In all cases seed vernalization preceded development of core flush. Seeds removed from apples showing core flush were more vigorous and germinated more rapidly than those removed from similarly treated sound fruit.—Central exp. Fm, Ottawa.

174. SAINSBURY, G. F., AND SCHOMER, H. A.
Cooling pears in fibreboard cartons.
Agric. Mktg, 1957, **2**(3): 6-7, illus.

The loss of field heat in cold stores was much slower in closely stacked pear containers than in those more widely spaced. This effect was more marked in fibreboard cartons than in wooden boxes. At the end of the storage period pears in fibreboard cartons were slightly riper than those in wooden boxes.

175. POMA-TRECCANI, C., BOLZANI, P., AND PERROTTI, G. L.
Prematurazione e influenza sullo sviluppo delle caratteristiche organolettiche e sulla durata di conservazione di pesche cv. J. H. Hale refrigerate. (**Pre-ripening and its effect on eating quality and cold-storage life of J. H. Hale peaches.**) [English summary ½ p.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 269-93, bibl. 22.

Data are presented on changes in juice content, acidity, content of reducing and other sugars, firmness and flavour as affected by exposure of the fruit to temperatures of 22°-24° C. for 2, 3 or 4 days between harvesting and cold storage. Pre-ripening improved all aspects of the eating quality, the 3-day treatment giving the best results, but storage life was shortened by the 3-day and still more by the 4-day treatment.

Packing and marketing.

(*See also* 66, 67, 68n, 180c, e, t, 287.)

176. EAVES, C. A.
Non-refrigerated apple shipments to the West Indies in polyethylene-lined boxes.
From abstr. in *Rep. Canad. Cttee Fruit Veg Preserv. for 1956*, 1957, p. 6.

McIntosh apples were shipped from Halifax, N.S., to Barbados, Jamaica and British Guiana in ordinary storage in boxes with (1) no liners, (2) folded liners, (3) sealed liners, (4) sealed liners with 92% N_2 with or without soda lime, and (5) sealed liners with 15% CO_2. The fruit in unlined boxes arrived in Barbados in good condition, but not in British Guiana. In all lined boxes fruit tended to develop blossom end spot, which was believed to be due to a combination of toxic levels of CO_2 and high temperatures. Brown heart developed in the CO_2 treated fruit. A later shipment of Delicious, Cortland and McIntosh apples to Jamaica in unlined boxes and in sealed liners arrived in good condition except that fruit in the sealed liners was too moist. It was found possible to ship Delicious apples in ordinary storage at 45-85° F. over a period not exceeding 14 days.—Exp. Fm, Kentville, N.S.

177. RYALL, A. L., AND KAUFMAN, J.
Ripening en route.
West Fruit Gr, 1957, **11**(8): 39-41.

Tests were carried out on methods of improving the acceptability of Californian Bosc pears on eastern U.S. markets. It was found that colour on arrival could be improved and the period required for ripening could be shortened by treating the pears with ethylene immediately after harvest and by modifying the refrigeration treatment during transit.—U.S. Dep. Agric.

178. SOMMER, N. F.
Pear transit simulated in test.
Calif. Agric., 1957, **11**(9): 3-5, 16, illus.
(SOMMER, N. F., AND FIELD, R.)
Bartlett carton shows promise.
West. Fruit Gr, 1957, **11**(6): 45, illus.

Pears of 4 varieties, Bartlett (Williams'), Winter Nelis, d'Anjou and Comice, were wrapped and packed in standard wooden boxes or jumble-packed, without wrapping, in cartons which measured 8¾ in. × 11½ in. × 17 in. internally and held 37 lb. of fruit covered with a compression pad. A special method of fastening the cover maintained tension on the fruit. The containers were subjected to bumps and vibrations comparable to those experienced in normal transit. The pears in the cartons suffered less damage than those in the boxes. In addition nearly half the boxes, but none of the cartons, suffered serious structural damage. However, for the jumble-pack carton method to prove equally successful on a commercial scale several factors will have to receive careful attention. [See also *H.A.*, 27: 1165.]—Univ. Calif., Davis.

179. BOLES, E. D.
New pack for ripe fruit.
West. Fruit Gr, 1957, **11**(9): 29, 32, illus.

Moulded pulp trays packed in special wooden crates with a flexible top have given very satisfactory results as containers for peaches in tests in California. The fruit is held firmly in place, hydro-cooling is possible, and the pack is uniform and attractive. The crates can be easily stacked.

Noted.

180.

a ANDERSON, J. D., ANDREWS, P., AND HOUGH, L.
Occurrence of 2-*O*-methyl-L-fucose as a constituent of plum leaf polysaccharides.
Chem. Ind. Lond., 1957, No. 44, p. 1453, bibl. 8.
First recognition in nature [see also *H.A.*, 27: 180].

b ANDREWS, P., AND HOUGH, L.
The biosynthesis of leaf polysaccharides.
From abstr. in *Biochem. J.*, 1957, **67**(1): 11P-12P, bibl. 2.
In leaves of the Victoria plum.

c ANON.
New pack for winter pears.
West. Fruit Gr, 1957, **11**(9): 33, 35, illus.
Inconclusive tests with a new tray-packed corrugated carton, laminated with polythene film.

d ATKINSON, J. D.
Science in the fruit industry.
Reprinted from *Science in N.Z.*, 1957, pp. 12.
A review of fruit research in New Zealand.

e BEDFORD, C. L., AND ROBERTSON, W. F.
Effect of handling and processing methods on the firmness and quality of canned and frozen red cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 51-8, bibl. 4.
By soaking in calcium solutions and by canning with added calcium and/or sugar.

f BRADT, O. A.
Apricots at the Ontario Horticultural Experiment Station.
Fruit Var. hort. Dig., 1957, **12**: 15.
Note on the 4 best varieties at Vineland, none of which crops consistently well.

g BREGLIA, G.
L'Annurca, pregevole varietà di melo della Campania. **(Annurca, a fine apple variety from Campania.)** [French, English and German summaries 16 lines each.]
Frutticoltura, 1957, **19**: 361-6, illus.
Characteristics of the variety and production figures for dessert apples in individual European countries.

h CHACE, W. G., JR., DEWEY, D. H., AND PFLUG, I. J.
A tent for the controlled-atmosphere storage of apples.
Quart. Bull. Mich. Agric. Exp. Stat., 1957, **40**: 181-92, bibl. 10, illus.
The trial was successful. The various problems encountered are discussed.

i CHRIST, E. G.
Apple and pear varieties grown in New Jersey.
Ext. Bull. St. Univ. N. Brunswick, N.J. **302**, 1957, pp. 16, illus.

j CURLEE, D.
Fig harvest mechanized with pickup machine.
West. Fruit Gr, 1957, **11**(11): 20-1, illus.

k (FRENCH, B. O.)
Peach varieties for canning.
Fruit World, Melbourne, 1957, **58**(7): 11-13, illus.
Notes on 9 varieties for Victoria.

l FRIEDRICH, G.
Abschliessende Beurteilung einiger unter mitteldeutschen Verhältnissen geprüfter Birnen- und Pflaumen-Unterlagen. **(Final evaluation of some pear and plum rootstocks tested in central Germany.)**
Gartenbauwiss., 1957, **22***: 71-80, bibl. 6.

m FUNK, T.
Anfangsergebnisse bei der Selektion vegetativ vermehrbarer *Prunus mahaleb*- und *Prunus avium*-Formen. **(Preliminary results from the selection of vegetatively propagated forms of *Prunus mahaleb* and *Prunus avium*.)**
Gartenbauwiss., 1957, **22***: 87-9, bibl. 2, illus.
Nursery behaviour of possible cherry rootstocks.

n GERRITSEN, C. J.
De buitenperzik. **(Outdoor peaches.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 723-31 (bibl. available from author), illus.
Trials in the Netherlands.

o GREEN, F. M.
Peach orchard management.
Pamphl. Colo. Exp. Stat. **3-S**, 1957, folder of 13 sides, illus.

p HANNIGAN, M. A.
Deciduous fruit varieties in the Granite Belt.
Qd agric. J., 1957, **83**: 385-9, illus.

q HUNT, D. M.
Orchard drainage.
Tasm. J. Agric., 1957, **28**: 233-6, illus.

r JACOBONI, N.
Il pesco in Umbria, con particolare riguardo alla cv. Montecorona. **(Peaches in Umbria, with special reference to the variety Montecorona.)**
Ital. agric., 1957, **94**: 809-30, bibl. 19, illus.
Montecorona has greater frost resistance and a higher percentage fruit set than J. H. Hale, Charles Ingouf or Pieri 81. [See also *H.A.*, 27: 257.]

s MANN, G.
Points to consider in building and operating refrigerated stores for fruit.
Worcs. agric. Chron., 1957, **25**: 149-57.

t MAUCH, A.
Die neue Dammannsche Sortiermaschine. Vorläufiger Bericht). **(Dammann's new grading machine. Preliminary report.)**
Mitt. ObstVersuchsringes Jork, 1957, **12**: 104-5, 205-6, illus.
For apples and pears.

u MEYER, J. L.
Moisture needs compared.
West. Fruit Gr, 1957, **11**(10): 14.
In a cultivated and summer-cover-cropped peach orchard.

v MORETTINI, A.
La Gialla Precoce Morettini, incrocio J. H. Hale × (Lord Napier × Fior di Maggio). **(The peach variety Morettini's Early Yellow, hybrid from J. H. Hale × (Lord Napier × Mayflower).)** [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 457-66, bibl. 10, illus., and *Ital. agric.*, 1957, **94**: 789-800, bibl. 10, illus.
Very early, free-stone, vigorous and prolific.

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* Reverting to Vol. No. in complete series.

w Morettini, A.
Recenti contributi italiani allo studio degli innesti negli alberi da frutto. **(Recent Italian contributions to the study of grafts in fruit trees.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 339-46, bibl. 57.
A review of anatomical, physiological and technical aspects.

x Natividade, J. V.
O problema do solo em fruticultura. **(The problem of soil in fruit growing.)** [English and French summaries ½ p. each.]
Bol. Junta nac. Frut. Lisbon, 1954, **14**: 7-16 [received 1957].
A discussion.

y Overcash, J. P., and others.
Peach variety testing in 1956.
Miss. Fm Res., 1957, **20**(1): 4-5, 8, illus.
Tabulated data on yields, date of harvest, and colouring of peach varieties in Mississippi.

z Pedrini, E.
Le varietà di pesco, pero e susino Morettini. **(The Morettini varieties of peach, pear and plum.)** [English, German and French summaries, 3 lines each.]
Frutticoltura, 1957, **19**: 558-64, bibl. 8, illus.

181.

a Pesaresi, S.
Nuove "Super Delicious" da mutazioni gemmarie. **(New Super Delicious apple varieties from bud mutations.)**
Frutticoltura, 1957, **19**: 383-4.
Red King, Hi-Red, Hi-Early and Starkrimson from Starking; Royal Red from Richared.

b Pflug, I. J., Angelini, P., and Dewey, D. H.
Fundamentals of carbon dioxide absorption as they apply to controlled-atmosphere storages.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 131-8, bibl. 11.

Pflug, I. J., Dewey, D. H., and Brandt, M. W.
An absorber for the removal of carbon dioxide from controlled-atmosphere storage.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 139-46, bibl. 3, illus.

c Poapst, P. A., and Phillips, W. R.
The effect of temperature near 32° F. on the storage behavior of McIntosh apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 4.
Results of mechanical and chemical tests.

d Roby, F.
La fruticultura en Catamarca. **(Fruit growing in Catamarca.)**
Idia, 1957, No. 110, pp. 5-8, illus.

e Rogers, H.
Pressure cooling plants.
West. Fruit Gr, 1957, **11**(7): 43-4, illus.
Various designs of plants for cooling fruit prior to transport.

f Selivanova-Gorodkova, E. A.
Bird cherry (*Prunus padus*) and its biological characteristics. [Russian.]
Bot. Žurnal, 1957, **42**: 1258-66, bibl. 30, illus.
A description of inverted growth and rooting of branches resulting in natural vegetative propagation.

g Welchert, P.
Pflaumensorten im Vergleich. **(Plum varieties compared.)**
Dtsch. Baumsch., 1957, **9**: 261-7, bibl. 4.
Arranged according to time of ripening.

h Williams, R. R.
Perry pears for planting.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 48-50, bibl. 4.
The characteristics of 20 varieties.

i Zielinski, Q. B.
Apple varieties for Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **563**, 1957, pp. 30, illus.

SMALL FRUITS, VINES AND NUTS.

Small Fruits.

(*See also* 1, 42, 45, 53, 66, 69, 70, 79, 219a-c, e, i-k, n-p, 220d, 392, 398, 972, 1006, 1007.)

182. Garretsen, F., and Kronenberg, H. G.
Opbrengstproeven met zwarte bessen. **(Yield trials with black currants.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 424-32, bibl. 13, illus.

The results from trials with several blackcurrant varieties in different parts of the Netherlands are summarized. The variability per bush and variety was calculated, and the coefficient of variation was found to be 50–60%. Further calculations have shown the number of bushes per variety required to demonstrate real differences in production at 5% significance in trials containing 5–20 varieties. Finally some important points in the design and maintenance of black currant trials are discussed.—Inst. Vered. Tuinbouwgewass., Wageningen.

183. Luckwill, L. C., Kieser, M. E., and Pollard, A.
Fruit drop in blackcurrants: III. The effect of l-naphthalene acetic acid applied before harvest.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 66-70, bibl. 2.

By delaying picking for 6 days beyond the normal harvest date the total crop weight of young bushes of Mendip Cross black currant was increased by 21%;

however, the quality of the fruit was reduced, 23% being over-ripe. The ascorbic acid content of the juice was significantly less than that of fruit harvested at the normal time. 1-naphthalene acetic acid at 10 p.p.m. applied 4 days before the normal harvest date had little effect on crop weight or quality when harvest was delayed for 6 days. At 25 p.p.m. the same compound resulted in a marked stimulation of ripening and in a reduced yield. A marked negative correlation was observed between the degree of ripeness of the fruit, as measured by the percentage of over-ripe berries, and the ascorbic acid concentration in the juice. [From authors' summary. For parts I and II see *H.A.*, 26: 3414 and 3416.]

184. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med beskæring af solbærbuske. (Foreløbig meddelelse.) **(Pruning trials with black currants. Preliminary communication.)**
Tidsskr. Planteavl, 1957, **61**: 543-4.

On the basis of several years' comparative trials at 4 Danish experiment stations, light to medium thinning out is recommended for black currants.

185. Rake, B. A.
The propagation of gooseberries: IV. Softwood cuttings.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 70-2, illus.

Cuttings from the basal portion of new shoots of "Keepsake" rooted significantly better than those prepared from the tip. The removal of buds had no effect on the percentage strike. [For Part III see *H.A.*, 26: 3424.]

186. Rake, B. A.
The propagation of gooseberries: V. Layering.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 72-5, bibl. 1, illus.

Five methods of layering were tested on the gooseberry varieties Leveller and Careless. Tip layering resulted in bushes of unsatisfactory shape. The best results were obtained from shoots layered by burying a 2-in. portion in the soil, leaving 2 in. of the growing tip uncovered. Leveller produced more shoots on the layer than Careless, but Careless produced more vigorous bushes than Leveller after one year in the nursery. [From author's summary.]

187. Robertson, M.
Further investigations of flower-bud development in the genus *Rubus*.
J. hort. Sci., 1957, **32**: 265-73, bibl. 6.

Dissections in the autumn and winter of 1953–54 showed that flower initiation began in 7 forms of *Rubus* at the following approximate times: red raspberry (*R. idaeus*) var. Lloyd George, early September; black raspberry (*R. occidentalis*) var. Cumberland, mid-October; purple-cane hybrid raspberry (*R. idaeus* × *R. occidentalis*, a seedling of known origin), early to mid-September; loganberry (East Malling clone), mid- to late September; blackberry var. Himalayan Giant, mid-October; blackberry var. Ashton Cross, late March; blackberry (a local wild form), mid-March. These times refer to the primary (main) buds at cane nodes. Initiation generally began later in secondary buds and still later, if at all, in tertiary buds (small buds in the scale-axils of primary and secondary buds). The development of primary inflorescences reached a fairly advanced stage in autumn in the loganberry and in the purple-cane hybrid and red raspberries, but occurred mainly in spring in the black raspberry and in blackberries. [Author's summary. For earlier work see *H.A.*, 23: 302 and 27: 3200.]—Scot. hort. Res. Inst., Dundee.

188. Bennett, L. G.
Financial results of strawberry growing in South Hampshire. A note on the results of a pilot survey made in 1954.
Misc. Cost Studies, Dep. agric. Econ., Univ. Reading **30**, 1956, pp. 7.

In this preliminary survey of the economic aspects of strawberry growing in South Hampshire, costs, yields and returns are analysed for 4 holdings producing under frames or cloches and 5 holdings producing mainly in the open. The causes of variation in financial results are discussed.

189. Iacopini, P.
Contributo allo studio di alcune cultivar inglesi di fragola. **(Contribution to the study of some English varieties of strawberry.)** [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 487-99, bibl. 17, illus.

Madame Lefebvre, Huxley 44, Cambridge 32, Royal Sovereign, Elite Climax s.c. 15, Brusca Ferrarese, Madame Moutot and Belle de Meaux are described, and the 5 English varieties are compared with the 3 Italian for time of ripening, flavour and disease resistance.

190. Neri, M.
Una pianta colonizzatrice della collina imolese: il fragolone Madame Moutot. **(The strawberry variety Madame Moutot, a plant increasingly common in the uplands of Imola.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 413-23, illus.

This strawberry variety is frequently grown as an intercrop in young top-fruit orchards. Details of cultivation in orchards and fields are given, control of pests and diseases is described and an economic analysis is set out for establishment and maintenance per ha. covering 3 years.

191. Nielson, P. E., and Wilhelm, S.
Some anatomic aspects of the strawberry root.
Hilgardia, 1957, **26**: 631-42, bibl. 15.

Studies on the root system of the garden strawberry (*Fragaria virginiana* × *F. chiloensis*) growing in light sandy soils in California showed that it extended to a depth of 2 ft. with extensive branching. The large adventitious roots show a polyderm consisting of alternating bands of suberized and unsuberized cells. The health of a strawberry plant as far as root growth is concerned is dependent on the continued production of new adventitious roots from the crown and on the ability of these roots to produce secondary tissues, which insure their perennial existence.

192. CLARKSON, V. A.
Black plastic aids dry strawberries.
Bett. Fruit, 1957, **52**(3): 20-1, illus.

Irrigated Siletz strawberries grown on a hill system showed no significant increase in yields between plastic mulched and non-mulched plants. Observation plots on a hill soil without irrigation have indicated that mulched plants will out-produce non-mulched plants in the first year.—Ore. St. Coll.

193. SONVIL, W. A.
Plastic controls weeds.
Amer. Fruit Gr, 1957, **77**(10): 11, illus.

Polythene strips 28–33 in. wide and ·0015 in. thick have been used successfully for mulching commercial strawberry fields in California. A crosscut is made over each plant and the plant is pulled through the slit. The mulch suppresses weeds, reduces fruit rot and may result in a saving in irrigation. Black has generally been more effective than transparent plastic.

194. BOULD, C., AND CATLOW, E.
Manurial experiments with fruit: II. The effect of treatments on soil fertility and on the growth, yield and leaf nutrient status of strawberry, var. Royal Sovereign.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 84-93, bibl. 3.

Differential manuring over a period of 30 years has produced significant differences in soil fertility. Plots receiving F.Y.M. had a higher organic carbon content than plots receiving inorganic fertilizers; the level of organic matter on all plots, however, was reasonably good, which would account for the relatively small effect of omitting fertilizer N on the growth of the strawberry, a crop that has a low N requirement. The levels of available phosphate were not unduly low in the NK plots. Omission of fertilizer phosphate reduced the available soil phosphate by approximately one half. The exchangeable K on the NP and no manure plots was low and insufficient to supply the K requirements of the strawberry. The highest yield of fruit was obtained from plots treated with F.Y.M. The results emphasize the importance of adequate supplies of K for high yields of good quality fruit, the relatively low requirement for fertilizer N and the apparent lack of response to fertilizer phosphate, except in the early stages after planting. [From authors' discussion. For part I see *H.A.*, 24: 3555.]

195. BJARSCH, H.
Unterschiede im Vitamin-C-Gehalt bei Erdbeerfrüchten. (**Differences in vitamin C content of strawberry fruits.**)
Dtsch. Gartenb., 1957, **4**: 220-2, bibl. 10.

Highly significant differences were found between ascorbic acid contents in 6 strawberry varieties. Within the varieties vitamin C contents increased with increasing K levels up to the level of 100 kg. K_2O/ha., after which contents were reduced. In pot tests the ascorbic acid content was inversely related to the amount of chloride, and directly related to the amount of sulphate, in the potassic fertilizers. In the field the same tendency was observed with the chloride content, but in areas where the rain contained high levels of sulphate, the sulphate in the fertilizer had an unfavourable effect on ascorbic acid content. There was an indication in the Sachsen and Soltwedel varieties that contents of ascorbic acid were higher in fruits from bare soil than in those from mulched soil.—Inst. Gartenb., Leipzig.

196. GASTON, H. P., AND LEVIN, J. H.
Ventilated picking lugs for strawberries to be processed.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 546-56, illus.

Trials were carried out in the 1956 picking season to compare the handling of 100,000 lb. strawberries in ventilated picking lugs (V-lugs) with handling a similar quantity in the conventional manner. The investigation showed that V-lugs cost less, facilitate quicker picking, are easier to handle in the field and enable more fruit to be carried per truckload than do conventional methods. The grading of the fresh and processed fruit which had been picked and transported in V-lugs was slightly higher than that of the fruit handled normally, probably owing to there being less bruising. J.R.L.

Vines.

(*See also* 1, 63, 148, 219d, f-h, m, n, q-u, x, 220a, c, 1010.)

197. BRUNI, B.
La viticoltura e l'enologia nelle provincie di Smirne e Manisa in Turchia. (**Viticulture and enology in the Turkish provinces of Smyrna and Manisa.**)
Riv. Vitic. Enol., 1957, **10**: 179-82, illus.

Production and drying of sultana grapes, the principal type grown in Turkey, are described. Varieties of table grapes are listed. Wine grapes are rare, most of the low output of wine being from sultana grapes. A brief note on Turkish viticultural research institutions is included.

198. GEISLER, G.
Untersuchungen zum Verhalten interspezifischer *Vitis*-Kreuzungen gegen Trokkenheit. (**Studies on the behaviour of interspecific *Vitis* hybrids under drought conditions.**)
Vitis, 1957, **1**: 82-92, bibl. 22, illus.

Hybrid seedlings from interspecific crosses were classified according to their reaction to drought. There was a marked difference between the progeny of Riesling and Sylvaner, those of the latter producing a relatively higher number of susceptible seedlings. Crosses between Vi 107 and Vi 2401 showed the highest proportion of drought resistant seedlings. [For earlier work see *H.A.*, 27: 3215.]—BundesforschAnst. Rebenzücht., Geilweilerhof.

199. RADLER, F.
Untersuchungen über den Gehalt der Moste einiger Rebensorten und -arten an den Vitaminen Pyridoxin, Pantothensäure, Nicotinsäure und Biotin. (**Studies on the contents of the vitamins pyridoxin, pantothenic acid, nicotinic acid and biotin in the must of some vine varieties and species.**)
Vitis, 1957, **1**: 96-108, bibl. 22.

Vitamin contents of musts from about 100 different vine species and varieties were determined. Biotin contents were very small, and their nutritional value was unimportant. Contents of pyridoxin, pantothenic acid and nicotinic acid varied greatly, but musts with the highest contents were of nutritional value. A positive correlation was found between pyridoxin and pantothenic acid contents; both vitamins were highest in *Vitis solonis robusta*, *V. riparia*, *V. cinerea* and some of their progeny. The varieties of *Vitis vinifera* cultivated in Germany were particularly low in these vitamins.—BundesforschAnst. Rebenzücht., Geilweilerhof.

200. Raman, K. R.
The early growth behaviour of two commercial grape varieties under Madurai conditions.
South Indian Hort., 1956, **4**: 118-27, bibl. 14.

Pachadraksha vines raised from cuttings planted *in situ* produced taller, sturdier plants than did plants raised in the nursery from cuttings of the same age and subsequently transplanted. Rooted cuttings of the grape variety Seedless transplanted and trained to form a double stem produced more canes than did vines trained to a single stem or than plants raised from cuttings planted *in situ*. Young Seedless grape vines grew less vigorously than Pachadraksha vines which flowered within 7 months of planting.

201. Manaresi, A., and Capucci, C.
La fertilità dei polloni nella *Vitis vinifera*. **(The fertility of suckers in *Vitis vinifera*.)**
Riv. Vitic. Enol., 1957, **10**: 71-81, bibl. 20, illus.

Fertility of suckers from frost-damaged vines varied from 84% in the variety Moscatellone to nil in Lambrusco types. Most of the fertile suckers bore fruit in the year of formation and again the following year.

202. Tavadze, P. G.
The effect of varying light intensity on the pigment content of vine leaves. [Russian.]
Doklady Akad. Nauk, S.S.S.R., 1957, **115**: 623-5, bibl. 2.

The contents of chlorophyll, carotene and xanthophyll were determined in the leaves of young and bearing vines grown under full (100%), 50%, 30% and 15% normal light. In most of the varieties studied there was an appreciable increase in the chlorophyll content with decrease in light intensity, but little change in the content of the carotinoids. Natural shading by the leaves of neighbouring plants also increased chlorophyll content. Trials on the variety Rkaciteli showed that a 50% reduction in light intensity increased not only the content of pigments but also yields without reducing quality.

203. Crescimanno, F. G.
Risultati di prove sulla stimolazione rizogena in talee del vitigno portainnesto 1.103 Paulsen. **(Results of experiments on root stimulation in cuttings of the vine rootstock Paulsen 1103.)** [English and French summaries ½ p. each.]
Nuovo G. bot. ital., 1956, **63**: 283-97, bibl. 7, illus.

Neither IAA at 25 or 50 p.p.m. nor the urine of pregnant cows at 15% as aqueous solutions stimulated rooting. In confirmation of previous work [see *H.A.*, 26: 1493], however, water gave excellent results, the optimal time for treatment being 44 hr. Spacing at 6 cm. was more successful than at 4 cm. along the furrow, and rooting was better in vertical than in obliquely placed cuttings.

204. Birk, H., and Schenk, W.
Über die Beeinflussung von Traubenertrag und Mostgewicht durch die Pfropfunterlage der Reben unter besonderer Berücksichtigung der Unterlage *Berlandieri × Riparia Teleki 5 C Selektion Geisenheim.* **(The effect of vine rootstocks, in particular Berlandieri × Riparia Teleki 5 C Selection Geisenheim, on berry yield and must density.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 188-97, bibl. 9.

The authors discuss the lay-out and evaluation of adaptation trials for vine rootstocks. The importance of statistical treatment is stressed and it is recommended that the degree of significance be given in results. In comparing 2 Riesling clones on different rootstocks it was shown that variations in yield within the clone on different rootstocks were small, but the average yield of one clone was much higher than that of the other. Geisenheim selections of Berlandieri × Riparia Teleki 5 C gave more satisfactory results than Berlandieri × Riparia Kober 5 BB in trials at Geisenheim. There was no clear negative relationship between yield volume and variation.

205. Peyer, E.
Ergebnisse zehnjähriger Prüfungen von veredelten Reben auf verschiedenen amerikanischen Unterlagensorten. **(Results of 10 years' trials with grafted vines on several American rootstock varieties.)** [French summary 1 p.]
Landw. Jb. Schweiz., 1957, **6**: 373-415, bibl. 13, illus.

The performance of several American rootstocks grafted with Riesling × Sylvaner or Pinot noir has been observed in various parts of Switzerland. Berlandieri × Riparia 8B (Wädenswil selection), and in dry situations 5C (Wädenswil selection), gave good results in soils associated with chlorosis. In general Chasselas × Berlandieri 41B was resistant to chlorosis. Berlandieri × Riparia 5BB was too vigorous for close planting, and was not satisfactory with Pinot noir scions. 3309 Riparia × Rupestris showed marked symptoms of chlorosis in a soil containing 20–23% lime in the topsoil and 23–29% in the sub-soil. On the basis of his experience in these trials the author prefers a design of simple comparative trials with 1 to 3 replications on fairly large plots, rather than a Latin square design with replications.—Wädenswil.

206. Peyer, E.
Die Umstellung eng gepflanzter Stickelreben auf arbeitssparenden erweiterten Satz oder Drahtbau. **(The conversion of closely-planted staked vines to the labour-saving methods of wider spacing or wire culture.)**
Schweiz. Z. Obst-u. Weinb., 1957, **66**: 571-5, illus.

By removal of every third transverse row of staked vines in steeply-sloping vineyards labour requirements are reduced but yields are maintained. Training along wires rather than individual staking is recommended for young plantations on less steep slopes, and the change in older plantations may be effected by removal of every third row. A method of pruning the more vigorous growth resulting from wider spacing is described.—Wädenswil.

207. de Lorenzo, F.
Nuovo sistema di allevamento della vite a cordoni sovrapposti con "razzoli". **(A new system of training vines as espaliers with spurs.)**
Riv. Vitic. Enol., 1957, **10**: 255-65, bibl. 6, illus.

The plant is trained vertically and allowed to form 3 pairs of horizontal shoots along wires 70, 120 and 170 cm. from ground level, 3–4 spurs being left on each section of vertical stem. Summer pruning is entirely omitted. The technique of planting and training is described in detail, and also that of transforming the traditional arched vines to espaliers, which is possible with vines up to 15 years old and requires 3 years before full production is resumed. The main advantages of the new system are improved root development and increased yield.

208. Katamadze, E̊. I.
The effect of topping on vine yields. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 6, pp. 26-8.

Experiments were conducted in Georgia on the effects of different degrees and timings of topping. Plants were topped moderately (6-7 upper leaves removed, 20–25% reduction in leaf area) and severely (50% reduction) during active growth, failing growth, growth cessation and commencement of fruit ripening. Highest yields and best quality were obtained by moderate topping at growth cessation (late July–early August); this treatment is also stated to reduce the incidence of downy mildew. Vigorous varieties in wet seasons need topping twice, during active growth and at growth cessation.

209. Konlechner, H.
Über Beziehungen zwischen Grünmasse und Ertrag der Rebe. **(The relationship between leaf and shoot growth and yields in vines.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 209-15, bibl. 2.

When flower number was unchanged, an increase in shoot number was accompanied by higher yields and a lower must density. A moderate reduction in number of grape bunches resulted in increased yields, but a marked reduction did not lead to the expected improvement in quality. The optimum number of shoots and leaves must depend on variety, training and environmental conditions.

210. Cosmo, I., and Gentilini, L.
Sulla concimazione della vite. **(Vine manuring.)**
Riv. Vitic. Enol., 1957, **10**: 33-5.

A review covering N, P, K and Ca manuring, and recommending fertilizer treatments for dwarf, medium and tall vines and modifications of these for various soil types.

211. Kobayashi, A., Hosoi, T., and Inoue, H.
Growth and yield of grapes as related to the concentration of nitrogen, phosphoric acid and potassium in sand culture. II. On the ratio of potassium to nitrogen. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 73-82, bibl. 4, illus.

Growth, yield and quality of young Delaware vines was studied in relation to the K/N ratios supplied in the nutrient solutions. When N was supplied to non-fruiting vines at 40–80 p.p.m., the best shoot and root growth occurred with K at ½ or ¼ of the N level. A K/N ratio of 1 : 2 was best for flower initiation in the following year. The toxic effect of 160 p.p.m. N was lessened by the addition of 160 p.p.m. K. On fruiting vines fruit yield and quality were highest at a K : N ratio of 1 : 2. Shoot and root growth decreased with increases in the K/N ratio. [For part I see *H.A.*, 25: 3656.]

212. C.S.I.R.O., Australia.
Irrigation.
A.R. C.S.I.R.O., 1955-56, 1956, pp. 37-40.

Merbein: Yield of sultana vines has been related to the amount of sunshine in the spring 17 months previous to harvest. In soil management tests with sultana vines no cultivation but oil herbicide sprays resulted in as good yields as the control (ordinary cultivation with winter cover crop), while white clover sod plots yielded less; white clover sod turned in 18 months previously increased yields by nearly 25%. Krilium soil conditioner failed to increase yield or give earlier ripening of tomatoes on a loam or a heavier soil. *Griffith:* Citrus yields in sod and bare surface soil treatments were increased by N fertilizer, but fruit quality was adversely affected. During wilting of tomatoes uptake of N and P was markedly reduced, and both nutrients were translocated from the laminae to the stem. On re-watering active uptake of N and P was resumed and both passed preferentially to the laminae rather than to the stem; the net result was a depression of nutrient content for the whole plant. In Washington Navel oranges there was a significant difference in uptake of N and P with nitrate and ammonium N sources; no significant growth responses to brief salinity stress were observed, but absorbed Cl remained in the plant and passed into new leaves.

213. Galzy, P., and Nigond, J.
Essai d'obtention d'un retard à la maturation des raisins de table. **(An experiment on delaying the ripening of table grapes.)**
Progr. agric. vitic., 1957, **148**: 86-92, 125-30, 141-50, bibl. 14, illus.

NAA at 0·5% or 0·25% was applied at the end of July or mid-August to Servant grapes. The sugar/acid ratio of the must was reduced by the treatment, so that maturity was markedly delayed. Fruit volume was significantly increased after the July treatment. Treated grapes showed less *Botrytis* infection. Total yields were not reduced by NAA treatment. The sugar content of the must was much reduced by treatment, especially after that given in August. The acid content was not affected.—École nat. Agric., Montpellier.

214. SCHANDERL, H.
Über das Vorkommen und die Bildungsweise der Gerbstoffe und der Anthozyane in den Rebengewächsen. **(The occurrence and mode of formation of tannins and anthocyanins in vines.)** [English, French and Spanish summaries 10 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 229-45, bibl. 17, illus.

Tannic acids are produced in the vine protoplasm by plastid-like cysts, which line the cellular walls or fill the cells: these tannic-acid-producing bodies also frequently occur in wound-callus. Some blue varieties contain anthocyanin dissolved in the cell-juice of the berries, other blue varieties and the red ones store it in cysts, usually together with tannic acid, in the protoplasm of the skin cells. In processing these varieties the cysts have to be broken open to get at the colouring matter. Red wine processing is done by pulp fermentation or heating and pressure fermentation. *Penicillium expansum* will destroy the intracellular anthocyanin cysts, thus freeing the colouring matter but not destroying it. [From author's summary.]—Geisenheim.

215. MARTIN, R. J. L., AND STOTT, G. L.
The physical factors involved in the drying of sultana grapes.
Aust. J. agric. Res., 1957, **8**: 444-59, bibl. 1, illus.

The various physical factors involved in the drying of sultana grapes have been determined from measurements of drying rate under definite conditions of temperature, humidity and air flow in a specially constructed oven. Of the weight lost 95% is water, 2% is CO_2 and 3% unassigned loss. Drying occurs in 3 distinct stages: (1) the grape retains its regular ellipsoidal shape by an elastic contraction of the skin; (2) the skin commences to wrinkle in the range of 20–50% loss in original weight; (3) the drying rate decreases markedly, beginning when approximately 95% of total loss of weight has occurred and when probably all the free water has been removed from the system. Water movements through the parenchymal cells are fast compared with those through the skin. Since various dipping treatments give different drying rates there is no rate-controlling diffusion through the stationary air layer at the grape surface. The drying rate is controlled by the diffusion of water through the waxy cuticle, and is inversely proportional to the amount of cuticle present as determined by extraction with chloroform. The elastic contraction of the skin causes an increase in the thickness of the cuticle which reduces its permeability. The heat required for the evaporation of water and for heating the grape to the equilibrium drying temperature is transferred from the surroundings to the grape. The rate of drying increases rapidly with rise in temperature owing to the vapour pressure of water and the permeability of the cuticle increasing with the temperature. [From authors' summary.]—C.S.I.R.O., Merbein, Vict.

Nuts.

(*See also* 63, 148, 219 l, w, y, z, 220b, e.)

216. SHARPE, R. H., AND GAMMON, N., JR.
Fertilization of pecans.
A.R. Fla agric. Exp. Stats, 1955-56, pp. 95-6, illus.

Heavy June drop of nuts in some areas is associated with shallow soils, which result in moisture deficiency. Mouse ear associated with low leaf contents of Mn, is of minor commercial importance [see *H.A.*, 27: 2341t]. High N, and N plus K have increased yields in experimental plots [see also *H.A.*, 27: 1234].

217. SPINA, P., AND PENNISI, F.
La coltura del pistacchio in Sicilia. **(Growing pistachio in Sicily.)** [English, German and French summaries 5 lines each.]
Frutticoltura, 1957, **19**: 533-57, bibl. 1, illus.

Aspects discussed include soil and climatic requirements, floral biology, pollination, varieties, rootstocks, cultural practices, pests and diseases. Even on poor rocky soil pistachio grows satisfactorily when grafted on terebinth (*Pistacia terebinthus*) or on pistachio × terebinth hybrids.

218. ZIELINSKI, Q. B.
Comparison of walnut rootstock varieties in Oregon.
Fruit Var. hort. Dig., 1957, **12**: 10-11, bibl. 1.

Three years' growth records are reported on seedlings of 5 varieties of *Juglans regia* and one each of *J. cinerea*, *J. hindsii*, *J. nigra* and *Pteracarya stenoptera*. At the end of this period the tallest trees were those of the Northern California black walnut (*J. hindsii*), followed by the Chinese wingnut (*P. stenoptera*); the latter however, had the largest trunk diameters. Among the Persian varieties (*J. regia*), the most vigorous and also the most uniform was Manregian.—Ore St. Coll., Corvallis.

Noted.

219.

a ANON.
Does plastic help?
West. Fruit Gr, 1957, **11**(7): 26, illus.
Growers' experience with black plastic mulch for strawberries in California.

b BAUER, —.
Abstammung der Johannisbeeren u. Stachelbeeren. **(The origin of currants and gooseberries.)**
Dtsch. Baumsch., 1957, **9**: 280-7, illus.

c BLAIR, D. S., AND OTHERS.
Strawberry culture in Eastern Canada.
Publ. Canada Dep. Agric. **1005**, 1957, pp. 19, illus.
Including varieties recommended for each province.

d BOUBALS, D.
L'organisation des vignes d'expérimentation. **(The lay-out of vine trials.)**
Progr. agric. vitic., 1957, **148**: 31-49, 67-73.

e Bretaudeau, J.
Les petits fruits. **(Small fruits.)**
Jardins Fr., 1957, **3**: 102-7, illus.
Raspberry, red currant and black currant growing in France.

f Cosmo, I.
I portinnesti della vite in Italia. **(Vine rootstocks in Italy.)**
Riv. Vitic. Enol., 1957, **10**: 3-13, 39-43, bibl. 6.

g Cosmo, I., and Polsinelli, M.
Fortana. **(The vine variety Fortana.)** [English summary 3 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, Suppl. pp. CLXXI-CLXXXI, bibl. 14, illus.
A dark-skinned wine grape.

h Cosmo, I., and Polsinelli, M.
Negrare. **(Three strains of Negrare red wine grape)**, bibl. 29. Lagrein. **(The Lagrein red wine grape)**, bibl. 8. Teroldego. **(The Teroldego red wine grape)**, bibl. 16. Ribolla gialla. **(The Ribolla gialla white wine grape)**, bibl. 9. Durella. **(The Durella white wine grape)**, bibl. 5. Fogarina. **(The Fogarina red wine grape)**, bibl. 5. Corvine Veronesi e Corbina Vicentina. **(The Corvine Veronesi and Corbina Vicentina red wine grapes)**, bibl. 18. Girò. **(The Girò red wine grape)**, bibl. 19.
Ann. Sper. agrar., 1957, Vol. **11**, No. 3, Suppl. pp. CCLIII-CCCXLIV, illus.

i Darrow, G. M.
Blueberry growing.
Fmrs' Bull. U.S. Dep. Agric. **1951**, revised 1957, pp. 33, illus.
Including descriptions of species and varieties and details of propagation and culture. [For previous revision see *H.A.*, 23: 293.]

j Darrow, G. M., and Scott, D. H.
Recent performance of the Earliblue and Bluecrop blueberries.
Fruit Var. hort. Dig., 1957, **12**: 12.
Notes on fruit size, etc., in comparison with other varieties. [See also *H.A.*, 27: 241m.]

k Darrow, G. M., Scott, D. H., and Hough, L. F.
A new blueberry introduced—Blueray.
Bull. N.J. agric. Exp. Stat. **783**, 1956, pp. 4.
See also *H.A.*, 26: 3419.

l Del Gaudio, S.
Compilazione di una scheda amigdalografica. **(Compilation of an amygdalographic record.)** [French, English and German summaries 11 lines each.]
Frutticoltura, 1957, **19**: 367-73, illus.
A proposed international descriptive list of almond varieties.

m Del Gaudio, S., and Giusto, D.
Impigno. **(The Impigno, a white wine grape)**, bibl. 2. Francavidda. **(The Francavidda, a white wine grape)**, bibl. 3. Susumaniello. **(The Susumaniello, a red dessert wine grape)**, bibl. 5.
Ann. Sper. agrar, 1957, Vol. **11**, No. 3, Suppl. pp. CLIX-CLXIV, illus.

n Del Gaudio, S., and Panzera, C.
Negro Amaro. **(The Negro Amaro grapevine.)** [English summary 3 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, Suppl. pp. XXXIX-XLVI, bibl. 7, illus.
A dark-skinned wine variety.

o Doehlert, C. A.
Blueberries in the garden.
Circ. N.J. agric. Exp. Stat. **579**, 1957, pp. 4, illus.
Recommendations for amateurs.

p Fulton, J. P., and Seymour, C.
The Arkansas strawberry certification program.
Plant Dis. Reptr, 1957, **41**: 749-54, bibl. 17, illus.

q Haritonov, A. F. (editor), and others.
[Forty years of Soviet wine-making and viticulture.]
Vinodelie i Vinogradarstvo, 1957, No. 7, pp. 1-64, illus.

r Hausner, M.
Weinbergschlepper. **(Tractors for vineyards.)**
Techn. Landw., 1957, **9**: 418-21, illus.
Recent developments in tractors and attachable implements discussed and illustrated.

s Hidalgo, L.
Beneficio de furfural a partir de subproductos del viñedo. **(The production of furfural from waste products of the vineyard.)**
Bol. Inst. Invest. agron. Madrid, 1957, **17**(36): 55-8.
From grape bagasse and vine shoots.

t Johns, H. K.
The pruning of grape vines.
J. Agric. W. Aust., 1957, **6**: 265-79, illus.
Spur and rod pruning described and well illustrated.

u LaVine, P. D.
Wine grape handling.
West. Fruit Gr, 1957, **11**(5): 26-7, illus.
Various types of bulk loading machines used in California are discussed and illustrated.

v Lord, W. J.
Soil management of strawberries.
Market Grs' J., 1957, **86**(6): 4-7.
Recommended green manure crops and rotations with sod crops.

w Pavlenko, F. A.
Propagation of hazel by softwood cuttings. [Russian.]
Sad i Ogorod, 1957, No. 6, pp. 59-60, illus.
Most of the varieties rooted readily but some required treatment with heteroauxin at 0·2 g./l.

x Prest, R. L.
Grapes in southern coastal Queensland.
Qd agric. J., 1957, **83**: 381-4, illus.
Varieties, rootstocks, cultivation and nutrition.

y de la Rocha G., G.
Propagación vegetativa del pecano, 1956. **(Vegetative propagation of pecan, 1956.)**
Inf. mens. Estac. exp. agríc. La Molina, 1957, **31**(357): 1-4, bibl. 2, illus.
Whip and tongue grafting gave excellent results when carried out with Stuart scions on 2-year-old rootstocks. [For earlier work see *H.A.*, 27: 237.]

z Spina, P.
Studio sulle principali cultivar di mandorlo in provincia di Siracusa. **(Study of the chief chief varieties of almond in the province of Syracuse.)** [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 500-18, bibl. 35, illus.

220.

a Stalé, J.
Le compostage du marc de raisin. **(Composting grape marc.)**
Rev. romande Agric. Vitic., 1957, **13**: 69-70, bibl. 2, illus.
Method and manurial value.

b Urquijo Landaluce, P.
La regeneración del castaño. **(The regeneration of the chestnut industry.)**
Bol. Inst. Invest. agron. Madrid, 1957, **17**(36): 85-92.
The results of breeding for resistance to ink disease (*Phytophthora* spp.). [For earlier work see *H.A.*, 27: 236.]

c Vega, J.
La viticultura en Catamarca. **(Viticulture in Catamarca.)**
Idia, 1957, No. 110, pp. 1-4, illus.
Training, irrigation, varieties and suggestions for improving production.

d Vitkovskij, V. L.
The black currant variety Primorsk Champion in the Transpolar region. [Russian.]
Sad i Ogorod, 1957, No. 6, pp. 56-7.
Found to be frost resistant and adapted to uninterrupted summer daylight.

e Zanotti, L.
Il castagno in Sardegna. **(Chestnuts in Sardinia.)**
Ital. agric., 1957, **94**: 681-4, illus.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

See 8-10, 337y, z, 338a, 347-355, 973.

Disturbances of nutrition or of unknown origin.

(*See also* 80, 136, 337c, l.)

221. Millikan, D. F., Pickett, E. E., and Upchurch, W. J.
Growth and leaf analysis of one-year-old apple trees grown in sand culture at different levels of calcium and potassium, with and without boron.
Abstr. in *Phytopathology*, 1957, **47**: 529.

Measles-affected trees in Missouri respond to applications of B, yet rarely show fruit symptoms. Tests showed no difference in the B content of soil around a healthy and that of soil around a diseased tree, but there was a high K/Ca ratio in the latter. Thirty-two scions from a diseased source and 32 from a healthy source were bench grafted and planted in sand as randomized paired samples; there were 4 replicates with a total of 16 trees within each. Trees were fed twice weekly: treatments consisted of a modified Hoagland's solution with a K/Ca ratio of 195/210 and one with a ratio of 540/30, both with and without B. Growth measurements were made every other week and leaves analyzed at the end of the season. Growth for the minus-B treatments essentially ceased after the first month. Trees fed with the high-K solution grew only about 50% as much as those fed the normal solution, with or without B. Both B and K influenced Ca uptake. In the high-K±B treatments, the K/Ca ratio in leaves was approximately 12, whereas leaves on trees given the normal treatment (±B) showed a ratio of about 3. Trees on the high-K treatment contained approximately 15% more B than did those grown on normal solutions. The addition of B to the normal solution resulted in about 60% increase in uptake of Ca. This was also noted in the high-K treatment but was less pronounced.

222. Compton, O. C.
Boron on Oregon pears.
West. Fruit Gr, 1957, **11**(10): 15, illus.

Thirty-year-old Bartlett pear trees showing B deficiency were treated with either a soil application of borax at ½ lb. per tree in the first week in April or with spray application of sodium pentaborate at 2 lb. per 100 gal. 3–4 days after bloom, 3 weeks after bloom or at both pre-blossom and 3 weeks after bloom. Control plots received no B. Only the trees sprayed pre-blossom produced normal flowers and leaves and a fair crop of fruit. Data are given for leaf and blossom contents of B following treatment. The deficiency level for leaves sampled in midsummer was about 14 p.p.m.

223. Bould, C.
The control of lime-induced chlorosis in fruit trees by iron chelates.
Proc. 6th Soil Science Congress, Paris, 1956, pp. 201-7, bibl. 15.

The author briefly discusses recent work of American and English workers, which has shown that at least temporary control of lime-induced chlorosis can be got by the proper and sufficient use of soil dressing and foliage sprays of iron chelates. Results are presented showing the response of chlorotic fruit trees, pear, plum and peach, to soil applications of FeEDTA, FeDTPA, FeHEEDTA and other iron chelates given as surface dressings followed by heavy working or as sub-soil injections. Stunted chlorotic pear trees produced vigorous healthy extension growth after treatment in May with 8 oz. per tree of FeEDTA or FeDTPA. FeHEEDTA was most effective when aqueous solutions were injected into the rooting zone. Foliage sprays were also effective and caused little damage when used at 1% strength with a wetter.

224. Gerber, H., and others.
Über die vorzeitige Rotverfärbung bei Reben. **(Premature reddening of vines.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 431-6, bibl. 1.

Premature reddening of vine leaves (variety Blue Burgundy) was delayed by foliar sprays of Mg salts during 2 seasons. The spraying should not be started before mid-July, and according to climatic conditions 3 to 4 sprays of 2% $MgSO_4$ or 2 to 3 sprays of 0·5–1% MgO may be applied. Soil injections of Mg had no effect.

225. Fisher, E. G.
Pear leaf scorch and its control.
Proc. N.Y. St. hort. Soc., 1957, pp. 189-90.

Scorch due to K deficiency can be corrected by K applications. Black leaf scorch appears to be caused by heat and seemed to be associated with high psylla populations. It might be remedied by planting pears in exposed locations, preventing the early season build up of psylla and avoiding the use of sulphur paste in summer.

226. Benson, N. R., Batjer, L. P., and Chmelir, I. C.
Response of some deciduous fruit trees to zinc chelates.
Soil Sci., 1957, **84**: 63-75, bibl. 19.

Soil applications of Zn EDTA and Zn HEEDTA were made to Zn-deficient peach, sweet cherry, and apple trees. Deficiency was corrected on peach and sweet cherry trees, but not on apple trees. Uptake of Zn was also indicated by a higher Zn content in peach and sweet cherry leaves, but there was no significant increase in apple leaves. In rate studies on peach it was found that at least 1 lb. of Zn chelate per tree was required for satisfactory Zn uptake. In time-of-application studies it was found that there was better uptake from a June than a November application. Trees in 2 peach and 2 sweet cherry orchards recovered from Zn deficiency better when treated with soil applications of Zn chelate than when sprayed in the dormant with Zn sulfate. In a third sweet cherry orchard recovery was equally good from both treatments. Sprays of Zn EDTA were applied only in the fall. In no case did such a spray appear to give satisfactory correction of Zn deficiency. [Authors' summary.]—Wash. agric. Exp. Stats.

227. Blodgett, E. C.
Prune crinkle leaf.
Phytopathology, 1957, **47**: 418-20, bibl. 6, illus.

Observations and transmission tests over a period of many years have shown that prune crinkle leaf, common on Italian Prune, is bud perpetuated, but is not caused by an agent transmissible by budding. It is concluded that the disorder, as well as the somewhat similar sparse leaf, is due to genetic instability. [From author's summary.]—Irrig. Exp. Stat., Prosser, Wash.

228. Hine, R. B.
Growth repression of pear trees planted following plum.
Abstr. in *Phytopathology*, 1957, **47**: 524.

A repressed growth condition in pear trees in old plum soil appeared where plums on Myrobalan rootstock had been removed and pears planted. The condition has persisted for at least 15 years. In an adjacent block, pears planted following peaches grew normally. Soil samples collected from the 2 adjacent orchards were planted to dormant pear seedlings and 3-week-old growing pear seedlings. After 2 weeks the seedlings were removed from the soil and observations and isolations made. Root development of seedlings in soil from the affected orchard was poor, and there were numerous lesions of feeder roots; in contrast, roots of seedlings in the other soil were well developed. *Pythium* isolates that proved to be pathogenic to pear roots were consistently recovered from the lesioned areas, whereas similar isolations from the roots in soil from the peach orchard yielded mostly *Fusarium*, which did not appear to be pathogenic. Carbon bisulfide applied at 3,300 lb. per acre gave no response, whereas steam treatment at 3 lb. per sq. in. for 2 hours eliminated the root rot condition in greenhouse tests. Methods to determine damping-off potential of the soils by indexing with susceptible vegetables revealed a higher potential in the soil from the plum orchard than in that from the peach orchard. Examination of soil and root samples failed to reveal pathogenic species of nematodes that might account for the problem.

Climatic factors.

(*See also* 27, 65, 70, 83, 99, 101, 112-116, 198, 337a, b, 984.)

229. Caborn, J. M.
Shelterbelts and microclimate.
For. Commiss. Bull. **29**, H.M.S.O., Edinburgh, 1957, pp. 135, bibl. 206, illus., 17s. 6d.

The author gives here the results of his original investigations at the Edinburgh University Forestry Department from 1953 to 1955 into the effects which belts of trees exert on the microclimates of their adjacent regions. In part one he reviews scientific evidence available on effects on agriculture and forestry. In part two he considers research procedure in connection with microclimatological investigations of shelter belt effects. Finally in part three he describes and discusses experimental work undertaken in relation to its practical application in Great Britain. Anyone faced with the problem of establishing shelter belts cannot fail to find this bulletin extremely useful.

230. VAN RHEE, J. A.
Beschuttingsproblemen in de Zeeuwse fruitteelt. **(Problems of orchard shelter in Zeeland.)** [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1957, **20**: 416-23, bibl. 3.

Observations on the effect of windbreaks in apple and pear orchards have been made during 5 years. Windbreaks running N–S gave shelter from the prevailing west wind to an area 8–12 times the height of the shelter. Apples were less susceptible to wind damage than pears, and those on dwarfing stocks were less susceptible than those on more vigorous stocks. The optimum distance between shelter rows for apples was 6 times the height of the shelter, and at this distance yields were increased by 73%. Pear shelters should be spaced at 4 times shelter height, when yields may be increased by 121%. Differences in growth between protected and unprotected trees were small, and fruit size was not affected by wind. Flower formation and fruit set were most seriously affected by strong winds.—Proefst. Fruitteelt, Wilhelminadorp.

231. KURAOKA, O.
Investigations on damage caused by salt-laden air brought by No. 13 typhoon (1953) to the fruit trees in the Hamamatsu region. [Japanese, with English summary $\frac{3}{4}$ p.]
Bull. Citrus Exp. Stat., Shizuoka, 1956, No. 2, pp. 3-24, bibl. 11, illus.

Injuries to pears, persimmons, peaches, vines, citrus and loquats are described. Two methods of preventing reblooming were used, namely MH sprays for pears and persimmons, and root pruning of pears. The effect of MH sprays on pears was dependent on variety, but leaf drop in persimmon was prevented by spraying 5–6 days before the typhoon. Root pruning of pear trees immediately after the typhoon was promising in preventing abnormal flowering as a result of typhoon damage.

232. STEPANCEV, I. N.
Hygrothermal regime of vines and anthracnose. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 6, pp. 28-32, bibl. 1.

An anthracnose, stated to be non-fungal and non-infectious, which seriously affects vines in Central Asia, is favoured by low spring temperatures, especially when the diurnal variation exceeds 24·5° C., humidity is higher than 68·4%, soil moisture is high and shoot growth too vigorous. Wine varieties, being more cold resistant, are less susceptible than dessert and currant varieties. Recommended control measures are: spraying with 6% ferrous sulphate, 20% milk of lime or 5% lime sulphur to retard bud burst in the spring; good drainage and moderate irrigation; no N but P applications; and moderate pruning to prevent excessive vegetative growth.

233. VERNER, L.
Procedure for determining resistance of sweet cherry varieties to fruit cracking.
Fruit Var. hort. Dig., 1957, **12**: 3-4.

A simple laboratory procedure developed some years ago by the University of Idaho is described. It is based on the submersion of 50 ripe cherries in distilled water held at 20° C. At 2-hour intervals up to 10 hours the fruit is removed and any showing cracks counted and discarded. The figures recorded at successive counts are weighted by multiplying them by 9, 7, 5, 3 and 1 respectively. The total weighted value is expressed as a percentage of the maximum possible value and is called the cracking index Comparisons have shown a close correlation between the cracking index and cracking found under natural conditions in the field on the same trees and in the same season.

234. GOIDÀNICH, G.
Esiti dei geli del 1956 sulla frutticoltura emiliana. **(Effects of the 1956 frosts on fruit-growing in Emilia.)**
Progr. agric. Bologna, 1957, **3**: 531-42, illus.

Recovery of peach trees and vines is described in detail, with anatomical microphotographs. Brief summaries are given for apple, pear, cherry, olive, persimmon and fig trees. [See also *H.A.*, 27: 3250.]

235. ROGERS, W. S.
Automatic frost control by water sprinkling.
Comm. Gr, 1957, No. 3227, pp. 834-5, bibl. 1, illus.

Details are briefly given of the 1957 results on the protection of apple blossom and fruitlets from spring frost by thermostatically controlled water sprinkling. Sprinkled trees cropped heavily while unsprinkled trees bore practically nothing.

236. ANTCLIFF, A. J., WEBSTER, W. J., AND MAY, P.
Recovery of sultana vines after spring damage.
Aust. J. agric. Res., 1957, **8**: 352-8, bibl. 6.

Sultana vines damaged in spring by frost or hail have been studied. The destruction by frost of half the shoots present when bud burst was nearly complete did not result in the bursting of more than at the most one-quarter of the primary buds which would normally have remained dormant. Primary buds bursting after the frost produced a much lower proportion of fruitful shoots than those bursting before. There was reduction in yield due not only to the smaller number of bunches but also to a decreased average bunch weight. Canes formed for the next season on vines frosted in early spring had more fruitful buds in the distal region and a higher overall fruitfulness. Canes formed on vines damaged by frost or hail much later in the season had fewer fruitful buds in the proximal region and a lower overall fruitfulness. Repruning of sultanas immediately after frost or hail to improve the yield in the same or the following season is not justified, but at the following winter pruning the canes should be left with more buds than usual. [Authors' summary.]—Commonw. Res. Stat., Merbein, Vic.

237. GOIDÀNICH, G.
Identificazione delle lesioni da grandine sulla frutta. **(Identification of hail damage on fruit.)**
Frutticoltura, 1957, **19**: 389-98, illus.

Hail damage in apples and pears is distinguished from other disorders and diseases such as bitter pit, lenticel rot, corky fruit (suberosis), ulcerous russeting, scab and spotting of fruits by insect pests.

238. ANON.
Hail protection: does it work?
West. Fruit Gr, 1957, **11**(5): 33, illus.

Notes are given on the successful operation of a hail-suppression service over the past 4 years in fruit districts of the Pacific coast of America. The method used is basically the same as that for rain stimulation, namely ground generation of silver iodide crystals, the effect being to increase competition for available moisture and prevent formation of large hailstones.

Viruses.

(*See also* 30, 101, 337d, f, j, m, n, t, 978, 1005.)

239. TANIĆ, B., AND JORDOVIĆ, M.
Nekoliko podataka o mozaiku jabuke. **(Some data on apple mosaic.)** [English summary 3 lines.]
Zasht. Bilja, 1956, No. 37, pp. 69-71, bibl. 4.

Symptoms on the varieties Jonathan and Alexander are described and attributed to a severe strain of apple mosaic virus, not prevalent in Yugoslavia.

240. SCARAMUZZI, G.
Una virosi con deformazione, maculatura verde e suberosi interna dei frutti di Cotogno (*Cydonia oblonga* Mill.). **(A virus disease of quince fruits causing deformation, green spots and internal pitting.)** [English and German summaries ¾ p. each.]
Phytopath. Z., 1957, **30**: 259-74, bibl. 39, illus.

This disease has been attributed to B deficiency, but injections of the nutrient did not affect symptom occurrence. The virus is bud transmitted.—Lab. Crittog. ital., Pavia.

241. EHLERS, C. G., AND MOORE, J. D.
Mechanical transmission of certain stone fruit viruses from *Prunus* pollen.
From abstr. in *Phytopathology*, 1957, **47**: 519-20.

Pollen was collected from Shiro plum and from Early Richmond, Montmorency, and Dyehouse sour cherries known to be infected with various stone fruit viruses. Mechanical inoculations were made to *Cyamopsis tetragonoloba*, *Sesbania exaltata*, *Nicotiana tabacum* and *Citrullus vulgaris*. Symptoms developed on 1 or more plants of those inoculated with a given virus source. Viruses A, B and E were found to be mechanically transmitted from pollen. It appears probable that virus G was also transmitted. No virus was recovered from inoculum prepared with pollen from a virus-free Montmorency source. The recovery of viruses A, B, E and possibly G from a given source indicated that differential transmission through pollen as a means of obtaining separation may not occur.

242. NYLAND, G.
Heat inactivation of ringspot virus in some stone fruit hosts.
From abstr. in *Phytopathology*, 1957, **47**: 530.

Ringspot virus was inactivated in portions of trees of Stockton Morello sour cherry, sweet cherry and Lovell peach seedlings after they were held for 17–24 days at 100° F. air temperature and 85° F. soil temperature. Up to 9 months after budding, Stockton Morello trees propagated from trees heated for 17 days have indexed negative for ringspot virus. Unheated trees have consistently tested positive. In most cases treated plants showed shock symptoms of ringspot in the new shoot growth about 3–4 weeks after latent or dormant buds began to grow. This permitted time for propagation before ringspot virus reinvasion occurred. The same strain of ringspot virus may be more easily inactivated in cherry than in peach.

243. WILLISON, R. S., AND WEINTRAUB, M.
Properties of a strain of cucumber-mosaic virus isolated from *Prunus* hosts.
Canad. J. Bot., 1957, **35**: 763-71, bibl. 24, illus.

Some of the stone-fruit viruses that are transmissible only to cucumber and other cucurbits have occasionally been accompanied by a second virus that can be isolated by transfer to tobacco. This virus appears to be latent in *Prunus* hosts, but induces symptoms in bean, cowpea, cucumber, *Datura stramonium*, *Nicotiana glutinosa*, petunia, tobacco, spinach, sugar beet, Swiss chard and zinnia. Tobacco plants infected with this virus are partially protected against cucumber mosaic virus but not against tobacco ring spot virus. [From authors' abstract.]

244. BLUMER, S.
Beobachtungen über die Weidenblättrigkeit der Fellenbergzwetschge (Prune dwarf). **(Observations on prune dwarf of Italian prune.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 531-7, bibl. 6, illus.

Growth of Italian prune trees was hardly affected by infection with prune dwarf virus, although yields were reduced by 50%. Infection was transmitted by vegetative propagation, but symptom expression varied according to variety.—Wädenswil.

245. WAGNON, H. K., AND TRAYLOR, J. A.
Results of some soil treatments for elimination of peach yellow bud mosaic virus from soil.
From abstr. in *Phytopathology*, 1957, **47**: 537.

Soil samples collected at 2 depths from the root zone of peach trees infected with yellow bud mosaic were treated with Nemagon, carbon bisulphide, Vapam, methyl bromide, D-D or steam, or were left untreated. Peach seeds were then sown in each lot. Yellow bud mosaic developed in many of the seedlings grown in untreated soil from the 4–18 in. layer, but no virus developed in seedlings grown in any of the treated soils or in the untreated soil from the top 4 in. layer.

246. CHAMBERLAIN, E. E., ATKINSON, J. D., AND HUNTER, J. A.
Occurrence of peach calico in New Zealand.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 813-19, bibl. 5, illus.

A virus disease that causes a brilliant yellow or papery white vegetation of leaves has been found on peaches and nectarines in New Zealand. Although widespread, it is present on only a few trees in any district. Symptoms on leaves, twigs and fruits, slow movement of the virus through trees, and the limited host range indicate that this virus disease is identical with peach calico described from the U.S.A. Heat treatment of growing plants at 99° F. for 40 days had no effect on the virus. [From authors' summary.]—D.S.I.R., Auckland.

247. Posnette, A. F., and Cropley, R.
A canker disease of cherry trees caused by virus infection.
Plant Path., 1957, **6**: 85-7, bibl. 7, illus.

A disease causing rough bark, spur cankers and bud death on Frogmore cherry trees has been shown to be graft-transmissible.—E. Malling Res. Stat.

248. Herzmann, H., and Baumann, G.
Untersuchungen über den Spurenelementgehalt viruskranker Sauerkirschenbäume. **(Studies on the minor element content of virus-diseased sour cherry trees.)**
Phytopath. Z., 1957, **30**: 329-38, bibl. 21.

Leaves from diseased trees were analysed at fortnightly intervals during the growing season. The greatest differences between healthy and diseased trees were apparent in the iron and manganese contents. It is suggested that uptake or translocation of these elements is disturbed by virus infection.—Inst. Phytopath., Aschersleben.

249. Scaramuzzi, G., and Corte, A.
La maculatura lineare del ciliego da fiore. **(Banded chlorosis of flowering cherry.)**
Inf. fitopat., 1957, **7**: 220-1, illus.

Ornamental cherry, variety Schimidsu Sakura, was not seriously affected by the virus causing banded chlorosis, but could be a reservoir of infection for other flowering cherries, mazzard, peach, plum and myrobalan. Line pattern of plum and myrobalan was due to the same virus as banded chlorosis of cherry.

250. Ochs, G.
Ein Virustest für Reben. **(A virus test for vines.)** [English, French and Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 274-8, bibl. 5, illus.

The author describes a time-saving method of testing virus infection of vines by inoculating test-plants with their expressed juice. By adequate choice of test-plant and varying the inoculation periods three different viruses can be discerned. [Author's summary.] —Inst. Weinb. Bernkastel-Kues/Mosel.

251. Ciccarone, A., and Cosmo, I.
Sulla classificazione dei sintomi della degenerazione infettiva della vite. **(Classification of symptoms of infectious degeneration of vines.)**
Riv. Vitic. Enol., 1957, **10**: 251-4, bibl. 10.

The vexed questions of nomenclature, multiple symptoms and inclusion of mosaic are discussed with reference to Italian, French and American work on this disease. [See also *H.A.*, 27: 1275.]

252. Brückbauer, H.
Untersuchungen zur Frage der Übertragbarkeit der Reisigkrankheit der Rebe durch Pfropfung. **(Studies on the transmission of infectious degeneration of vine by grafting.)** [English, French and Spanish summaries 9–12 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 171-88, bibl. 41, illus.

Rootstocks with infectious degeneration were grafted with Riesling scions and after 20 years the plants were compared with those on healthy stocks. Growth on diseased stocks was satisfactory. There was no correlation between the occurrence of intracellular "rods" and morphological changes in twig growth, nor between "rod" number in rootstocks and in scions. Yields from plants on diseased stocks were almost equal to those on healthy stocks. These results indicate that graft transmission of infectious degeneration does not occur. The suggestion that short internodes and double buds as well as intracellular rods are an indication of virus infection has not been confirmed.—Forschungsanst. Wein- u. Gartenb., Neustadt.

Bacteria.

(*See also* 83.)

253. Wolff, W. H., and Wolff, E. T.
Fire blight.
Amer. Fruit Gr, 1957, **77**(10): 12.

The hypothesis is put forward, without experimental evidence, that apple and pear trees may be protected from fire blight by the streptomycin produced by the mycorrhizal fungi on their roots, the mycorrhiza being encouraged by a combination of mulching and heavy fertilizer applications.

254. Daines, R. H., and Gray, R.
Streptomycin foliage sprays and control of bacterial spot of peach.
Phytopathology, 1957, **47**: 448, bibl. 3.

Streptomycin gave better control of bacterial spot of peach (*Xanthomonas pruni*) than sulphur or captan. Absorption and effectiveness of streptomycin were increased by the addition of glycerol to the spray.—Rutgers Univ. and Merck, Sharp and Dohme Labs, N.J.

255. Šutić, D.
Bakteriska pegavost lišća leske. **(Bacterial blight on filbert leaves.)** [English summary 1 p.]
Zasht. Bilja, 1956, No. **37**, pp. 47-53, bibl. 12, illus.

Three strains of a bacterial infection of filbert leaves were identified as *Xanthomonas corylina*. These strains were indologenic and were differentiated by their reaction to manitol and arabinose. For control the use of healthy planting material, removal of infected branches and spraying with copper or similar compounds are recommended.

Fungi.

(*See also* 70, 119, 228, 337i, k, 478.)

256. C.S.I.R.O., Australia.
Microbiology.
A.R. C.S.I.R.O., 1955–56, 1956, pp. 23-5.

Chemical basis of resistance in plants to fungal attack: An antibiotic principle has been separated from plant exudate from infected material. This principle arises as the result of interaction between living host tissue and parasite where the former reacts in a suprasensitive manner. The antibiotic principle which appears in French bean pods after infection with *Sclerotinia fructicola* appears to consist of 2 components which are dialysable. *Ripening influence of fruits diseased by Sclerotinia fructicola:* As a result of interaction between host and pathogen a gaseous principle is produced which causes, in adjacent stone fruits, hastened pigmentation of the skin, premature softening of the tissues, and chlorophyll decomposition in the flesh without any increase in sugar content. The reaction is autocatalytic and after initiation proceeds in the absence of the pathogen.

257. Martin, J. T., Batt, R. F., and Burchill, R. T.
Fungistatic properties of apple leaf wax.
Nature, 1957, **180**: 796-7, bibl. 9.
Martin, J. T.
Studies on the natural protective covering of plants: I. Plant wax in relation to resistance to infection by fungi.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 94-100, bibl. 10.

Fungi toxicity tests indicate that some of the components of the surface waxy layer of apple foliage and fruits, the fractionation of which is described, may play a part in influencing the resistance of this layer to surface infection by fungi. [From author's summary.]

258. Adams, R. E., and Tamburo, S. E.
The West Virginia spot-rot complex of apple in 1956.
Plant Dis. Reptr, 1957, **41**: 760-5, bibl. 8.

Twenty-four genera of fungi and several kinds of bacteria were isolated from lesions of unknown etiology on apple fruits. Their frequency of occurrence and pathogenicity to apple fruits are reported on.—W. Va Univ., Morgantown.

259. Sayed, M. Q., and Heuberger, J. W.
Temperature as it affects growth of apple fruit-rotting organisms and their response to fungicides in agar-plate tests.
From abstr. in *Phytopathology*, 1957, **47**: 453.

In agar cultures captan+zineb showed the greatest fungicidal properties against *Botryosphaeria ribis* [see also *H.A.*, 27: 281]. Captan showed the greatest fungicidal properties against *Physalospora obtusa* and *Monilinia fructicola*. They were least effective at temperatures found to be most propitious for the growth of the fungi.

260. Kirkham, D. S.
Studies of the significance of polyphenolic host metabolites in the nutrition of *Venturia inaequalis* and *Venturia pirina*.
J. gen. Microbiol., 1957, **17**: 120-34, bibl. 13, illus.

Extracts of the polyphenolic fractions of the water-soluble metabolites (that is, the complex mixtures of plant phenols extracted by ethyl acetate) were prepared from apple and pear varieties characterized by different degrees of resistance to the scab pathogens. Qualitative differences were chiefly interspecific and extracts of resistant varieties did not contain major components lacking in those of less-resistant varieties of the same species. Cultural reactions of distinct clones of each pathogen to the extracts, in the presence of various basal media, were observed. Growth and sporulation were inhibited independently by extracts of less-resistant as well as resistant host varieties. The clones were not equally susceptible, those of *Venturia inaequalis* showing relationships between inhibition of sporulation by host polyphenols and their varietal host ranges. Fluctuations in pathogenicity of a clone of *V. pirina* during storage in culture with periodic re-isolation from Williams pear were reflected in its reactions to the extracts. Both pathogens were capable of decomposing the polyphenols. The results suggested that qualitative and quantitative variations in the polyphenolic host metabolites, including differences in their relative proportions, in relation to nitrogenous and other nutritional factors, are of potential significance in the determination of pathogenicity and varietal resistance. [Author's summary.]—E. Malling Res. Stat.

261. Byrde, R. J. W., Clarke, G. M., and Harper, C. W.
Spraying experiments against apple scab at Long Ashton, 1956.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 103-8, bibl. 5.

In 1956, the last year of a 3-year trial, the level of apple scab was very low following post-blossom applications of either captan (0·075%) or lime sulphur (0·75%) with a single pre-blossom lime sulphur spray throughout. The use of captan was followed by a high level of apple mildew on shoots of the current season's growth, though the economic importance of the attack may be small. [From authors' summary.]

262. Soenen, A., Aerts, R., and Porreye, W.
La tavelure du pommier. (**Apple scab.**) [English and German summaries 5 and 6 lines respectively.]
Rev. Agric. Brux., 1957, **10**: 681-748, bibl. 72.

Preventive and curative methods of control are critically discussed. The Mills system of forecasting indicated more attacks than actually occurred, but no attack developed that was not forecast. Details are given of increases in leaf area during series of 4–6 day intervals in Cox's, Jonathan and Belle de Boskoop, indicating how this factor may affect the efficiency of fungicidal sprays. Resistance to rain was very high in Tuzet (TMTD+zinc carbamate+Urbacide), high in CPR 32 (chlorinated naphthalene), TMTD and zineb and low in barium polysulphide, copper oxychloride and particularly in wettable sulphur and inorganic mercury products. Persistence in dry weather was highest in CPR 32. In no case was control complete when trees were treated 24 hrs. or more after inoculation, but the curative action of most fungicides was considerable when they were applied 3–5 days after rain.

263. MARSH, R. W., AND EDNEY, K. L.
Spraying trials at Long Ashton 1953-1956 for the control of gloeosporium storage rot in Allington Pippins.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 109-15, bibl. 10.

In a 4-year trial on Allington Pippins a programme of double spraying, in mid-August and mid-September, with 0·1% captan consistently reduced the incidence of *Gloeosporium* rotting of the crop stored until February. This was further improved in 1956 by spraying also in July. A marked reduction in infection coincided with the change from arable cultivation of the plot to a grass cover.

264. BARTRAM, D.
Bull's eye rot threatens.
West. Fruit Gr, 1957, **11**(9): 28.

Bull's-eye rot [*Neofabraea* spp.], a late storage disease of apples, is caused by perennial canker spores being washed down from the trees onto the fruit in the pre-harvest period [see also *H.A.*, 27: 283]. Incidence may be reduced by spraying with ziram at 1½ lb. per 100 gal. in late August or early September, the last spray being not later than a week before harvest. Tests showed that apples should be removed from the orchard quickly after picking. Tree cankers should be scraped and treated with nicotine sulphate paint.

265. WOODHEAD, C. E.
Collar rot and root rot of Cox's Orange Pippin and other apple varieties.
Orchard. N.Z., 1957, **30**(6): 16-21, illus., and **30**(7): 2-9, bibl. 2.

An orchard survey has shown that collar rot [*Phytophthora cactorum*] is a serious disease of single-worked Cox's Orange Pippin trees in Nelson and Marlborough orchards. By topworking Cox on other varieties the risk of infection was reduced by at least 75%. Collar rot was insignificant in topworked trees up to 40 years old. Defective drainage was dominant in increasing disease incidence. Cultural methods of disease control are outlined. High-working of Cox on a resistant variety is suggested as a preventive measure.

266. BYRDE, R. J. W.
The varietal resistance of fruits to brown rot. II. The nature of resistance in some varieties of cider apple.
J. hort. Sci., 1957, **32**: 227-38, bibl. 30.

The bitter-sweet cider apple varieties Chisel Jersey, Dabinett and Yarlington Mill showed resistance to infection of fruit injuries by spores of *Sclerotinia fructigena* throughout the period July–November. Resistance to spore infection was partially correlated with the browning of the injured tissue and with the firmness of the apple flesh. There is strong evidence to suggest that the resistance to brown rot of certain high-tannin varieties of apple arises, at least in part, from reduction of the activity of fungal macerating enzymes by oxidized polyphenols, probably of high molecular weight, in the injured tissues. The latter substances probably act by precipitation of the enzyme and not by any effect on the plant cell. [From author's summary. For part I see *H.A.*, 26: 3517.]—Long Ashton Res. Stat.

267. OGAWA, J. M.
The dried fruit beetle disseminates spores of the peach brown rot fungus.
From abstr. in *Phytopathology*, 1957, **47**: 530.

Evidence suggests that *Carpophilus hemipterus*, which attacks only injured fruit and feeds on brown rot infected peaches on the ground and on the tree, may be instrumental in spreading *Sclerotinia fructicola* in the orchard. The practice of flood irrigation, which covers diseased fruits on the ground, may increase dissemination of brown rot spores by inducing contaminated beetles to move into the trees.

268. GROSCLAUDE, C.
Sensibilité de quelques variétés de pêchers au *Fusicoccum amygdali.* (**The susceptibility of some peach varieties to *Fusicoccum amygdali.***)
Arboric. fruit., 1957, No. 44, pp. 10-13, bibl. 3, illus.

Amsden was the least susceptible of the varieties tested in peach canker inoculations. The results emphasized the need for fungicide applications at leaf fall for canker control [see also *H.A.*, 27: 290].—Stat. Path. veg. Sud-Ouest, Pont-de-la-Maye (Gironde).

269. STOJANOVIĆ, D., AND KOSTIĆ, B.
Prilog proučavanju biologije *Polystigma rubrum.* (**A contribution to the study of *Polystigma rubrum.***) [English summary ⅓ p.]
Zasht. Bilja, 1956, No. **37**, pp. 21-7, bibl. 6, illus.

A single spray of 2% bordeaux or colloidal copper applied immediately after petal fall gave complete control of *P. rubrum* on plum trees.

270. STOJANOVIĆ, D., AND KOSTIĆ, B.
Parazitiranost stroma *Polystigma rubrum* sa *Gloeosporium polystigmicolum* u toku 1955 godine. (***Gloeosporium polystigmicolum*, a parasite on the stromata of *Polystigma rubrum*: 1955 observations.**) [English summary ¼ p.]
Zasht. Bilja, 1956, No. 37, pp. 91-2, bibl. 4, illus.

Of 46 plum orchards examined in Serbia for intensities of parasitization only 1 showed incidence as low as 40–50%, while 34 gave figures between 90 and 100%. The author notes that such high incidence can appreciably lessen *P. rubrum* attacks the following year.

271. CARTER, M. V.
Vines aid spread of apricot "gummosis".
J. Dep. Agric. S. Aust., 1957, **60**: 482-3, illus.
Fruit World, Melbourne, 1957, **58**(8): 31.

Observations in January 1957 showed that spores of *Eutypa armeniacae*, the apricot "gummosis" fungus, are produced on dead wood of many grape vine varieties in the 13–30 in. annual rainfall districts of S. Australia. The author recommends that all dead wood be cut from vineyards as thoroughly as it is from apricot orchards.—Waite agric. Res. Inst. J.R.L.

272. STRUBLE, F. B., AND MORRISON, L. S.
Blackberry anthracnose control and its relation to yield.
Plant Dis. Reptr, 1957, **41**: 766-9, bibl. 6.

Over a 5-year period it was demonstrated that blackberry anthracnose (*Elsinoë veneta*) could be controlled with a single delayed dormant application of liquid lime sulphur or bordeaux mixture. Additional late sprays of bordeaux or Fermate did not generally improve the control. There was no increase in fruit yield or fruit size as a result of disease control.—Okla agric. Exp. Stat., Stillwater.

273. GEARD, I. D.
Septoria leaf spot of black currants.
Tasm. J. Agric., 1957, **28**: 226-32, bibl. 5, illus.

The results of experiments on control of the disease [caused by *Mycosphaerella* (*Septoria*) *ribis*] conducted over three seasons are presented and discussed. It is concluded that a green tip application of bordeaux mixture followed by a cover spray of thiram or bordeaux mixture is the most effective schedule for controlling infection. The green tip application is essential for good control. Captan appeared to be as effective as thiram as a cover spray. Cover sprays of bordeaux mixture were shown to increase the copper content of the fruit at the time of picking, but although some evidence was obtained that both copper and thiram residues reduced vitamin C content during processing it is concluded that there is no objection to their use under present conditions. [From author's summary.]

274. CORKE, A. T. K.
Black currant leaf spot: a note on further laboratory tests of fungicides on overwintered leaves.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 120-2, bibl. 1.

Aqueous solutions of sodium pentachlorophenate and sodium-dinitro-*ortho* cresylate were again effective at 0·1% in preventing the maturation of ascospores of *Pseudopeziza ribis* on overwintered black currant leaves. Freshly prepared aqueous solutions of sodium DNOC and ammonium DNOC gave complete inhibition at 0·0125% and 0·025% respectively. Although complete inhibiting of sporulation followed the laboratory treatment of dead leaves with 0·0125% dinitro-*ortho*-cresol in 3% diesel oil emulsion, no control resulted from the use of the same material at 0·1% as a ground spray applied in the field on 15th December or 16th February. The oil emulsion alone was not fungicidal in the laboratory trials. [From author's summary. For earlier work see *H.A.*, 25: 338 and 3740.]

275. TAYLOR, R. E., AND SCHOFIELD, E. R.
Observations on the control of American gooseberry mildew.
Plant Path., 1957, **6**: 88-90.

In commercial trials with several gooseberry varieties dinitrocaprylphenyl crotonate gave the most satisfactory control of American gooseberry mildew infections.—N.A.A.S., Evesham.

276. COX, R. S., AND WINFREE, J. P.
Observations on the effect of fungicides on gray mold and leafspot and on the chemical composition of strawberry plant tissues.
Plant Dis. Reptr, 1957, **41**: 755-9, bibl. 8.

In field trials zineb and nabam provided the best control of leafspot, dichlone and Dyrene were almost as good, and thiram was least effective. Nabam-zinc sulphate and zineb appeared to increase Botrytis grey mould. Dichlone provided the best control of grey mould while thiram and Dyrene were almost as effective. Nabam-zinc sulphate caused moderate leaf chlorosis, zineb caused slight chlorosis. Neither material noticeably stunted the plants. Dichlone caused severe stunting but no noticeable leaf damage. Dyrene caused a slight bronzing of the leaf and some stunting. There were no differences between treatments in respect to total Ca, Mg, Fe, K, or in N fractions as determined by chemical analyses. Zinc accumulation was as much as 10 times greater in plants sprayed with nabam-sulphate or zineb than in untreated plants or those sprayed with other fungicides. [From authors' abstract.]—Everglades Exp. Stat., Belle Glade, Fla.

277. MAPPES, F.
Die Bekämpfung von *Botrytis cinerea* (Grauschimmelfäule) an Erdbeeren. **(The control of grey mould on strawberries.)**
Rhein. Mschr. Gemüse-, Obst- u. Gartenb., 1957, **45**: 117-18, illus., from abstr. in *Beerenobstschrifttum*, 1957, No. 7, p. 4.

Two sprays of Lutiram, at the start of flowering and at full bloom, have given excellent protection of strawberries against *Botrytis* infection. It is important that the sepals should be thoroughly wetted. By this method application of organic fungicides during harvest is avoided.

278. SCHULTE-SCHERLEBECK, —.
Grauschimmelfäule der Erdbeere, eine zunehmende Gefahr? **(Grey mould of strawberries, an increasing danger?)**
Rhein. Mschr. Gemüse- Obst- u. Gartenb., 1957, **45**: 118, from abstr. in *Beerenobstschrifttum*, 1957, No. 7, p. 5.

Control of grey mould may be obtained by Orthocide 50, Lutiram and B500 (a dust). At least 3 applications are necessary. High pressure sprays may be applied so that the undersides of the leaves and the sepals are covered. Spraying during moderately wet climatic conditions is possible.

279. POWELL, D.
A comparison of fungicides on disease control and yield of Concord grapes.
Trans. Ill. St. hort. Soc., 1956, **90**: 139-41.

At Urbana, Ill., in 1956 Captan (50% W.P.), 75% ferbam and Vancide Z-65, all at 2 lb./100 gal., gave good commercial control of downy mildew and produced respectively 34, 38 and 40 lb. grapes per vine compared with 23 lb. from the untreated plots. 4–6–100 bordeaux gave complete control, but the yield was only 9 lb. per vine. Crag 341 did not control downy mildew. None of the organic fungicides controlled powdery mildew.

280. SCHANTL, D.
Ergebnisse mit neuen Präparaten zur Peronosporabekämpfung im Vergleich zu Kupfer. **(Comparative results of new and of copper preparations for the control of downy mildew of vine.)** [English, French and Spanish summaries 2 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 271-4.

he author reports on investigations carried out with he purpose of comparing Dithane, Cuprosan and ordeaux mixture for downy mildew control. [Author's ummary.]

281. AL'TMAN, F. F.
Combined power and hand spraying of vines against downy mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 5, pp. 56-8, illus.

n illustrated description is given of a spraying achine for vines which is tractor-powered but has manually directed nozzles connected to the boom 4 m. long hoses. Each row is sprayed on either de by a separate nozzle. The use of this apparatus nsures thorough and timely application of bordeaux ver large areas.

282. PINE, T. S.
The use of captan in the control of the dead-arm disease of grapes.
Plant Dis. Reptr, 1957, **41**: 822-4, bibl. 6.

n 1955 captan applied to young growth gave better ontrol of dead-arm disease (*Phomopsis viticola*) than everal other compounds. In 1956 captan at up to lb./100 gal. reduced dead-arm infection appreciably, pecially when applied early when new shoots were nly about 1 inch long. In commercial vineyards the andard dormant treatment with sodium arsenite only ave partial control, as did foliar sprays of captan used lone, but control was much improved by using the two succession.—Univ. Calif., Davis.

283. PIERI, G., AND CORVETTO, A.
Impiego dell'Orthocide nella conservazione dell'uva da tavola. (Nota preliminare.)
(Use of Orthocide in storage of table grapes. Preliminary note.)
Riv. Vitic. Enol., 1957, **10**: 193-4, bibl. 2.

outine pre-harvest spraying with captan (Orthocide 0) or bordeaux mixture did not prevent deterioration grapes during storage, but when the bordeaux-treated grapes were dusted just before storing with 3% Orthocide 50 in bentonite the loss after 7 weeks as only 7–8% as against 40%, with no trace of *otrytis cinerea*, and after 12 weeks it was 90% as gainst 100% without dusting.

284. HARVEY, J. M.
Relation of field infection to decay in stored Emperor grapes.
Abstr. in *Phytopathology*, 1957, **47**: 523.

ncipient field infections are the primary cause of poilage in stored Emperor grapes. Post-harvest nfection is largely prevented by sulphur dioxide umigation. The measurement of infections present t harvest has been used to forecast decay in storage. rapes harvested within 2 weeks after exposure to ainfall suffered severe decay in storage; this was onsistent with forecast at time of harvest. Those arvested 3 weeks after exposure had a negligible mount of decay in storage, since infected berries were etected and removed at harvest. The forecast redicted variations in potential decay in individual ots as related to harvest date and vineyard source. This information was used as a guide to marketing nd to reduction of spoilage losses in storage. *Botrytis cinerea* was the principal cause of decay in grapes harvested after rainfall. Rots caused by *Cladosporium herbarum* and *Alternaria* sp. were less prevalent and were related less to rainfall than was *B. cinerea*. In dry seasons *C. herbarum* was the predominant cause of decay. Counts of spores present on the surface of grape berries at harvest indicated no relation between storage decay and spore population.

285. GILMER, R.
Phomopsis canker on Kadota figs.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 26-8.

A field trial has shown that increasing the concentration of organic mercury above 1 pt. per 100 gal. in the post-pruning spray treatment does not increase the control of canker. A second experiment showed that more than one application after pruning was no more effective than a single spray, and that the amount of surgery practised did not materially affect the amount of canker infection in the 1-year-old pruning cuts.
J.R.L.

286. WARNER, R. M., AND PRATT, D. F.
Orchard mold control experiments on dried figs.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 19-23.

Manzate, dithane and captan applications to Kadota figs in September 1955 and in August 1956 failed to control internal mould. In the second year May applications of dieldrin or heptachlor reduced the number of thrips more than sprays of endrin or DDT, but the authors state that more than one application may be needed if thrips are to be controlled sufficiently to reduce attacks of internal mould. The position of the plot in the orchard seemed to affect the incidence of mould as much as any of the treatments. J.R.L.

287. HARVEY, J. M.
The effect of handling practices and fungicide treatments on market decay losses in fresh figs.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 23-6.

In one test fig trees were sprayed with Manzate, Nabam +Zim salts or captan 12 days before harvest. The fruit was then stored for 6 days at 36° F. to simulate transit conditions and then held at 70° F. for 48 or 72 hours. Figs that were utilized within 48 hours after removal from storage had about one half as much decay when they had been sprayed with Manzate or Captan as when they had been left untreated. Nabam +Zim salts were not effective in reducing decay. Only slight benefit from the spray materials was still evident 72 hours after removal from storage. A test conducted in August showed that lining the picking boxes with newspaper reduced decay, 24 hrs after removal from storage, to $\frac{1}{3}$ that occurring in fruit from unlined boxes. During September a second test showed that field infection had increased so much that the beneficial effect of sanitary measures was reduced. In another test picked fruit dipped in Dowicide A and then dried had only 9% decayed fruit as compared with 25% in the untreated controls, but some injury was caused to the fruit. Sodium bisulphite dip reduced the decay to 13% but captan was not very effective. J.R.L.

288. O'Reilly, H. J.
Relative efficiency of airplane and ground application of sprays in controlling almond shot-hole disease.
From abstr. in *Phytopathology*, 1957, **47**: 530.

Airplane and conventional spray applications of ziram were made on almonds at 50% bloom and at petal fall. Airplane applications consisted of approximately 60 gal. of spray per acre and the ground applications of slightly over 300 gal. Ninety per cent. of the fruit on unsprayed trees and on those sprayed from the air was infected with *Coryneum beijerinckii*, whereas only 10% of that on trees given ground applications was infected.

289. Gäumann, E., and Naef-Roth, S.
Über die Toxine der *Endothia parasitica* (Murr.) And. **(On the toxins of *Endothia parasitica*.)** [English summary ½ p.]
PflSch. Ber. Wien, 1957, **19**: 9-16, bibl. 12.

The pathogen causing bark canker in chestnut, *Endothia parasitica*, was shown to produce at least two toxins, diaporthin and skyrin, the action spectra of which range from bacteria to flowering plants. The injuries caused by both compounds to young tomato shoots, on which they act as stem poisons, are discussed.—Inst. spez. Bot., Eidg. tech. Hochsch., Zürich.

290. Large, J. R.
Control of scab and other foliage diseases of pecan.
A.R. Fla agric. Exp. Stats, 1955–56, p. 114.

Unsprayed Moore and Moneymaker trees produced 74% nearly scab-free nuts, while Moore trees sprayed with bordeaux produced 100% nearly scab-free nuts. Scab control with Glyodin was improved by the addition of phenyl mercuric chloride; used as an aerial spray the mixture improved nut weight and quality. In preliminary spot spraying tests with Actidione and Endodmycin, there was no toxicity at 25 p.p.m., but young leaflets were injured at higher rates.

Nematodes.

(*See also* 111.)

291. Oostenbrink, M.
Der Transport von *Pratylenchus penetrans* (Nematoda) mit Pflanzgut. **(Transmission of *Pratylenchus penetrans* by plants.)** [English summary ½ p.]
Z. PflKrankh., 1957, **64**: 484-90, bibl. 4, illus.

It is known that *Pratylenchus* spp. are transported in the roots of nursery stock. However, poorly-developed "sick" pear seedlings with many nematodes on the roots grew vigorously in a relatively nematode-free soil, and the nematode population on the new root system remained at a fairly low level. It is suggested that nematode infestation of the soil is a more important consideration when planting than root infestation.

292. Mai, W. F., and Parker, K. G.
Nematodes cause serious root disease of cherry and other tree fruits in western New York.
Proc. N.Y. St. hort. Soc., 1957, pp. 77-81, illus.

In limited trials pre-planting soil fumigation with D-D at 450 lb./ac. and, where individual replants were to be made, with methyl bromide at 1 lb./100 sq. ft. reduced nematode populations and improved tree growth. [See also *H.A.*, 27: 306.]

293. Warner, R. M., and McBeth, C. W.
Effect of Nemagon applied to living fig trees.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 29-31.

Favourable growth responses were shown by young Calimyrna and older Adriatic fig trees to soil applications of Nemagon at various concentrations. There were no differences in yield. J.R.L.

294. Lownsbery, B. F., and Sher, S. A.
Soil fumigation for control of the root lesion disease of walnuts.
From abstr. in *Phytopathology*, 1957, **47**: 527-8.

Pressure-chisel machine applications of D-D, Dowfume W-85 and Nemagon at walnut planting sites in 3 California orchards heavily infested with root lesion nematodes (*Pratylenchus vulnus*) have resulted in satisfactory growth of California black and Paradox hybrid walnut replants for 3 seasons following planting. Neither of these rootstocks has grown satisfactorily at untreated control sites. Duration of benefits of pre-planting fumigation is uncertain because soil populations of root lesion nematodes returned to pretreatment levels in 2 seasons. A second treatment of some of the established replants with Nemagon at 5 gal./acre at the start of the third season reduced soil nematode density to a low level but produced no additional growth response.

295. Morgan, O. D., and Jeffers, W. F.
The effects of fumigation and heat treatment on root-knot nematode and black root rot of strawberries.
Plant Dis. Reptr, 1957, **41**: 825-31, bibl. 23, illus.
Morgan, O. D.
The effect of various control measures on two parasitic nematodes of strawberry.
From abstr. in *Phytopathology*, 1957, **47**: 52.

Neither 2 autumn treatments with D-D, each at 30 gal./acre, nor heat treatment of plants at 127° F. for 2 minutes gave satisfactory control of root-knot nematode (*Meloidogyne hapla*) on Robinson strawberries planted in April in heavily infested land. However, treatment 2 months after planting with Nemagon (25% granular 1,2-dibromo-3-chloropropane) at 68 and 136 lb./acre gave excellent control, whether the planting stock had been heat-treated or not. Regardless of soil fumigation, the number of daughter plants produced was significantly lower from heat-treated plants than from untreated plants. The effects of the treatments on black root rot, one of the causes of which may be a *Pratylenchus* sp., were inconclusive.—Univ. Maryland, College Park.

Mites.

296. Willis, R. J.
The influence of the apple spray programme on the incidence of the fruit tree red spider mite (*Metatetranychus ulmi* Koch) in Northern Ireland.
Res. exp. Rec. Minist. Agric. N. Ireland 1955, 1957, **5**: 12-28, bibl. 14.

e results of trials in selected orchards showed that, ereas the use of 0·05% DDT at green-cluster caused marked increase in red spider mite populations, a mparable application of 0·2% BHC at green-cluster d pink-bud initiated a reduction in the mite popula- n which was sustained throughout the summer. e use of 0·2% BHC at petal-fall did not have this ppressive effect to the same extent as pre-blossom plications and might be followed by a slight rise in te populations. The substitution of mercury-based mpounds for bordeaux mixture as the basis of the ray programme had no marked effect on mite pulations. The use of a captan-based spray pro- mme which included pre-blossom and post-blossom plications of 0·2% BHC resulted in the development much higher mite populations than occurred with a mparable mercury-based programme. Excellent ntrol of the mite was obtained by applications of 025% CPCBS or 0·02% chlorbenside in early June d again in mid-July.

97. Bua, G.
Esperimenti di lotta contro il ragno rosso.
(Experiments on control of red spider mite.)
Progr. agric. Bologna, 1957, **3**: 567-76, illus.

e best control of *Paratetranychus pilosus* was achieved spraying the apple trees, shortly before the winter gs hatched, with a mixture of Chlorocide O.M. -chlorobenzyl *p*-chlorophenyl sulphide), DNOC and neral oil. Omission of the Chlorocide only slightly uced effectiveness. Another promising solution in rial was 250 g. of 2,4-chlorophenyl benzene sul- onate per hl. of water, but used in a second locality as less effective. Calcium polysulphide was useless, mineral oil activated with phosphoric ester gave or control at 0·3% but was reasonably good at 4%. Contrary to the findings of other investigators, lorocide alone did not kill winter eggs; it did, wever, improve the action of DNOC on immature ns. The only compounds with definite ovicidal ects were DNOC and chlorophenyl benzene sul- onate.

98. Müller, G. F. W.
Morphology, biology and control of the hawthorn spider mite *Tetranychus viennensis* Zacher (*Acari, Tetranychidae*).
Höfchen Briefe (English edition), 1957, **10**: 1-60, bibl. 24, illus.

inter wash applications to apple trees did not give ficient control of the mite, allowing up to 20% rvival of the winter females. Control by phosphoric cid esters in the summer was very effective, and it is commended that these be applied in pre-blossom ray applications.—Inst. Plant Prot., Hohenheim.

299. Savzdarg, E̊. E̊.
Means of controlling mites on soft fruits in relation to their biology and ecology. [Russian.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 1, pp. 5-19, bibl. 49, illus.

he biology and host relationships of the cyclamen ite, *Tarsonemus pallidus*, on strawberries and the ack currant bud mite, *Eriophyes ribis*, on black rrants were studied, and control measures based on ese findings were worked out. In mature strawberry plantings mowing after cropping combined with organic manuring before planting and applications of 160–270 kg./ha. NPK thereafter gave the best control of cyclamen mite. Spraying with chemicals such as parathion and aldrin has so far not been successful. Of pre-planting treatments, placing the runners in hot water at 43° C. containing a growth stimulator (0·005% indolylbutyric acid) for 30 min. gave the best results, and growing mother plants in isolation is recommended. Acaricides tested against the black currant bud mite were considered inferior to lime-sulphur. Hot water treatment of currant cuttings at 45–46° C. for 13–15 min. in October resulted in a better plant survival than the same treatment in April. Red Spider mite, *Tetranychus urticae*, infestation of strawberry, raspberry and black currant is also mentioned, and it is noted that a high osmotic pressure (>13–14 atm.) of plant sap has an inhibitive effect on all 3 mites.

300. Allen, W. W.
Fumigation for cyclamen mite.
Calif. Agric., 1947, **11**(9): 9, 15, illus.

For the control of the cyclamen mite [*Tarsonemus pallidus*] on strawberries, fumigation with methyl bromide under plastic tarpaulins has proved the most effective method. However, it costs about $150 per acre, and careful attention to timing and to dosages and duration of exposure in relation to temperature is needed, if the treatment is to be fully effective and the plants are to remain undamaged. The procedure recommended for different seasons is outlined in this article.—Univ. Calif., Berkeley.

301. Kennedy, W.
New fumigating equipment combats cyclamen mite on California strawberry plants.
Market Grs' J., 1957, **86**(8): 2, illus.

A new machine is described which circulates methyl bromide evenly beneath a plastic tarpaulin. The gas is blown under the tarpaulin and suctioned back by means of fans. Regulators record the speed of gas movement and the concentrations at various spots, and indicate how much gas should be used under various conditions. The unit, consisting of motor, blower, gas regulator and metal hose attachments, costs $311. For control of cyclamen mite on strawberries it is recommended that the plants should be fumigated during winter when the females are hibernating in the crowns and when heavier concentrations of gas can be used without damage to the plants.

302. van de Vrie, M.
Biologie en bestrijding van de aardbeimijt.
(Biology and control of the tarsonemid mite in strawberries.) [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 433-8, bibl. 15.

Spraying strawberries with phosphoric acid esters has not given satisfactory control of *Tarsonemus pallidus*. In field trials 0·25% Kelthane or 0·1% endrin applied once after harvest gave good commercial control.—I.P.O., Wageningen.

Insect pests.

(*See also* 89, 337h, q, r, u-w.)

303. Bobb, M. L.
Insecticides for control of peach insects.
J. econ. Ent., 1957, **50**: 268-9, bibl. 4.

Field and laboratory studies of insecticides for control of plum curculio (*Conotrachelus nenuphar*), oriental fruit moth (*Grapholitha molesta*) and insects causing catfacing on peaches, mainly the tarnished plant bug (*Lygus lineolaris*), are presented for 1954 to 1956. Dieldrin gave outstanding control of the plum curculio and of catfacing insects, but was ineffective against the oriental fruit moth. Parathion and EPN gave satisfactory control of all peach insects studied. Chlorthion and Guthion also gave satisfactory control of the oriental fruit moth and the plum curculio, but these materials were not tested for control of insects causing catfacing. [From author's summary.]—Va agric. Exp. Stat., Piedmont Fruit Res. Lab., Charlottesville.

304. Domes, R.
Ursachen für das ungleiche Ausreifen von Himbeeren (Thysanoptera: Thripidae; Coleoptera: Byturidae). (**Causes of uneven ripening in raspberries.**) [English and Russian summaries 17 and 21 lines respectively.]
Beitr. Ent., 1957, 7: 263-7, bibl. 9, illus.

Infestation by all stages of *Frankliniella intonsa* were found to cause uneven ripening of individual drupels in the fruits of raspberry. Similar symptoms were shown to be due to injuries to conducting vessels by *Byturus tomentosus*. Uneven ripening increased susceptibility to *Botrytis cinerea*.

305. Costantino, G.
Lotta artificiale contro le larve e le pupe della mosca delle frutta (*Ceratititis capitata* Wied.) nel terreno mediante prodotti organici di sintesi, e particolarmente a base di ettacloro. (**Control of larvae and pupae of the fruit fly (*Ceratitis capitata*) in the soil with synthetic organic products, especially those based on heptachlor.**) [English summary ½ p.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, Suppl. pp. cxv-cxliii, bibl. 93.

Experiments with pots of soil showed promising results from a 6%-active heptachlor dust product at 3 g. per sq. m., either left on the soil surface or incorporated. A heptachlor-based emulsion 25% active, used as 0·3–0·4% aqueous surface spray at 300 c.c. per sq. m., was less effective.

306. McNicholas, F. J.
Spray schedules to handle apple maggot.
Proc. N.Y. St. hort. Soc., 1957, pp. 128-32.

Data for the emergence of apple maggot [*Rhagoletis pomonella*] in New York State from 1951 to 1956 are given. For control it is recommended to spray 5 times, at 10-day intervals, using DDT (twice), DDT plus lead arsenate (twice) and finally DDD. Some newer materials are also considered.

307. Frick, K. E.
Comparative toxicity tests as an aid in selecting insecticides for control of the cherry fruit fly.
J. econ. Ent., 1957, **50**: 256-9, bibl. 7.

The contact action of 18 insecticides was tested in the laboratory against the cherry fruit fly, *Rhagoletis cingulata*. Detailed results are given. The phosphate insecticide Diazinon and the non-phosphate Perthane were the most promising for orchard control. In orchard tests, Diazinon was slightly superior to parathion at equal dosages, while Perthane has given good control at 2–4 times the dosage of parathion required.—Irrigation Exp. Stat., Prosser, Wash.

308. Glass, E. H.
Insecticide resistance in apple insects with special emphasis on red-banded leaf roller.
Proc. N.Y. St. hort. Soc., 1957, pp. 121-7.

In 1956 red-banded leaf roller, *Argyrotaenia velutinana*, was found to have developed resistance to DDD, malathion and demeton but was effectively controlled by parathion, Phosdrin and the General Chemical Co. product 1189.

309. Proverbs, M. D.
Effects of temperature and humidity on toxicities of three insecticides to larvae of the codling moth (Lepidoptera: Olethreutidae).
Canad. Ent., 1957, **89**: 423-8, bibl. 4.

At constant temperature, the toxicities of DDT and methoxychlor to larvae of the codling moth, *Carpocapsa pomonella* (L.), were not markedly influenced by changes in relative humidity, provided the air was not saturated with water vapor. At 100% relative humidity, the toxicities were much lower than at any other humidity investigated. At constant relative humidity, DDT and methoxychlor were each more toxic at low than at high temperatures. Differences in temperature or humidity had no measurable effect on the toxicity of lead arsenate. With DDT or methoxychlor, summer temperatures in British Columbia orchards are less favorable than those in Ontario for initial control of codling moth larvae, whereas rainfall is more favorable. With lead arsenate, differences in temperature and rainfall, and with DDT, methoxychlor, and lead arsenate, differences in humidity between the two apple-growing areas evidently have no measurable effect on initial control. [Author's summary.]—Ent. Div., Sci. Serv., Dep. Agric., Ottawa.

310. Anon.
Needed: fruit moth spray that spares parasites.
Agric. Res. Wash., 1957, **6**(2): 11.

Parasites attacking the larval stage of the oriental fruit moth disappeared from peach orchards after parathion application, but were re-established within 2 to 3 weeks. Egg and cocoon parasites disappeared from May to July.—A.R.S. ent. Lab., Moorestown, N.J.

311. Franqueira, J. H.
Traças dos figos secos. (**Moths infesting dried figs.**) [French and English summaries 1 p. each.]
Bol. Junta nac. Frut. Lisbon, 1955, **15**: 7-144, bibl. 52, illus. [received 1957].

Four species of *Ephestia* and one species each of *Plodia* and *Myelois* were identified in warehouses in Portugal, the most serious pests being *E. calidella* and *E. cautella*. Full-grown larvae were highly resistant to all the insecticides tested, but adults and very young vae were killed on contacting surfaces treated with dane or Pybuthrin (a mineral oil product con- ning 0·3% of pyrethrin and 3% of piperonyl toxide). In practical circumstances these substances re only effective when sprayed on non-absorbent terials. Re-infestation was completely prevented by ing and covering the storage baskets with stiff paper, thout insecticidal treatment. For disinfestation the st economic treatment was fumigation with carbon ulphide at 200–300 g. per cu. m. for 18 hr. Chlorasol 0·3% ethylene dichloride+29·7% carbon tetra- loride) was more effective, but costly.

12. Neel, W. W.
Insecticide tests for the control of hickory shuckworms on pecans.
Miss. Fm Res., 1957, **20**(5): 2, illus.

st plots of pecan trees were sprayed with EPN plus stox or phosdrin plus systox during the summer, but infestations of shuckworm (*Laspeyresia caryana*) re only light the results of the tests were inconclusive. here were indications that the use of 2 or 3 applica- ons of EPN at 2 lb./100 gal. reduced late season festation. Systox was not effective, and the value of osdrin was questionable.

13. Phillips, A. M.
Control of hickory shuckworm on pecans.
A.R. Fla agric. Exp. Stats, 1955-56, pp. 84-5.

nder conditions of very heavy infestation, 2, 3 and 5 plications of EPN at 2- and 3-week intervals gave ir control of shuckworm. When 64% of nuts on sprayed trees were infested, 2 or 3 late applications EPN effectively controlled shuckworm. Parathion us DDT gave fair control, but was not so effective EPN.

14. Dicker, G. H. L., and Tew, R. P.
Some experiments to investigate the control of apple sawfly, *Hoplocampa testudinea* (Klug), by concentrate sprays.
J. hort. Sci., 1957, **32**: 254-64, bibl. 7.

small-scale field trials over 3 seasons small volumes f concentrated dispersions of nicotine, γ-BHC, aldrin r endrin in strong lime sulphur were applied to apple ees for control of sawfly. The insecticides were pplied by paint-gun at the rate of 3 gal. per acre to ees 5–7 ft. high planted at 300 to the acre. It was ound that for each insecticide there existed a dosage er acre below which consistent control was doubtful. n the case of BHC, aldrin and endrin these amounts greed closely with those resulting from conventional oncentrations applied hydraulically at 250 gal. per cre, viz. 0·16 lb./ac. γ-BHC, 1·25 lb./ac. aldrin and ·13 lb./ac. endrin. Nicotine, applied as a concentrate t a rate equivalent to 250 gal. per acre of 0·05% solu- on (i.e. 1·25 lb./ac.), failed to control sawfly and it is uggested that this may have been due to the use of a ub-lethal dosage. Slight and consistently high levels f control were obtained when BHC or endrin was pplied in admixture with concentrated lime sulphur, as ompared with equivalent dosage rates applied in water. his indicates that no serious incompatibility exists etween these insecticides and lime sulphur.— . Malling Res. Stat.

315. Łeski, R.
Studia nad szkodliwością i zwalczaniem owocnicy żółtorogiej (*Hoplocampa minuta* Christ). **(Studies on the control of and injury caused by plum sawfly (*Hoplocampa minuta* Christ.)** [English and Russian summaries 2 pp. each.]
Prace Inst. Sadown. Skierniewice, 1957, **2**: 167-93, bibl. 12.

The injury caused to plum trees is described and the effects of weather, location and variety on the severity of infestation are discussed. Satisfactory control was obtained with emulsions of 0·1% DDT, 0·1–0·15% BHC or 0·2% chlordane applied just before the larvae hatched at petal fall. With the DDT spray 2% lime sulphur should be included to suppress European red mite (*Paratetranychus pilosus*) populations.

316. Tadić, M.
Trešnjina osa. ***(Eriocampoides limacina* Retz.)** [English summary 1 p.]
Zasht. Bilja, 1956, No. **37**, pp. 7-19, bibl. 12, illus.

The slugworm, *Eriocampoides limacina*=*Caliroa cerasi*, occurs most frequently on pears, cherries and plums. Original work on the life history of the pest is described and methods of control are mentioned. Good results are said to be obtained with applications of rotenone and HETP before harvest and DDT, chlordane, toxaphene or BHC after harvest.

317. Johnson, W. T.
On the biology and control of the North American chestnut weevils.
Diss. Abstr., 1957, **17**: 189-90, being *Publ.* 17,806 of 88 pp.

Heptachlor, at a rate of 6–8 lb./acre applied as a spray or dust to the ground cover, has given excellent control of chestnut weevils (*Curculio* spp.) in preliminary tests. —Univ. Maryland.

318. Klingler, J.
Vorläufige Mitteilung über Unterschiede zwischen wurzelechten Europäerreben und Unterlagenreben in bezug auf Befall und Schaden durch den Gefurchten Dickmaulrüssler (*Otiorrhynchus sulcatus* F.). **(Preliminary report on differences between European vines on their own roots and rootstock vines in relation to infestation and damage by vine weevil.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 513-16, 538-40, bibl. 8.

In surveys of vineyards infested by *Otiorrhynchus sulcatus* it was observed that infestation appeared to be more severe on vines on their own roots than on rootstocks. This was confirmed in 2 experimental plots.—Wädenswil.

319. Hofmann, E. L.
Untersuchungen über unterschiedliche Nodositätenbildung an der Wurzel verschiedener Rebensorten bei Reblausbefall und deren Bedeutung für die Resistenzzüchtung. **(Studies on differences in nodule formation, induced by phylloxera, on roots of various vine varieties and its importance in breeding for resistance.)**
Vitis, 1957, **1**: 66-81, bibl. 48, illus.

Nodulation as a result of phylloxera infection was studied in *Vitis vinifera* and in American *Vitis* species and their progeny. Root growth continued strongly after nodule formation in the American vines, which normally show strong root growth. In the weaker *Vitis vinifera* varieties the roots rotted and died after nodule formation. Climatic and soil conditions affected root growth after nodule formation. Vigour may be used as an indication of tolerance or susceptibility, and this factor may be of importance in breeding vines for phylloxera resistance.—BundesforschAnst. Rebenzücht., Geilweilerhof.

320. Pieri, G.
Prove sull'azione del captano sulla fillossera gallecola della vite. **(Tests on the action of captan on phylloxera of vines.)**
Riv. Vitic. Enol., 1957, **10**: 119-21, bibl. 2.

Captan (Orthocide 50) was much more effective than either bordeaux mixture or zineb in controlling phylloxera on the rootstock 140 Ruggeri and on European vine varieties.

Other pests.

(*See also* 337e, 338b, c.)

321. Wolfe, H. R.
Controlling mice by using endrin.
Bett. Fruit, 1957, **52**(3): 7-8, 15, illus.
Mouse control with endrin sprays.
West. Fruit Gr, 1957, **11**(11): 18-20, illus.

Recommendations for orchard mouse control under Washington conditions are given. Sprays should be applied during October and November and 1·2–1·4 lb. endrin per acre has given satisfactory results. The cover crop must be thoroughly wetted, and the spray should be concentrated in the tree rows unless infestation is exceptionally severe. Endrin gives better control than toxaphene sprays or zinc phosphide baits.

Spraying and spraying machinery.

(*See also* 69, 337g, o, p, 826, 833, 854, 878.)

322. Ministry of Agriculture, London.
Fruit tree spraying.
Bull. Minist. Agric. Lond. **5**, 5th edition, 1957, pp. 32, illus., 3s.

This bulletin has been completely rewritten since the last edition in 1939 [see *H.A.*, 9: 1089]. The first chapter, "Planning", deals with training and protection of operators, ordering spray materials, checking the water supply and machinery, keeping records and organizing time and labour. Then follows a chapter on machinery, giving descriptions of different types of sprayers and dusters with advice on how to make a choice. The next chapter on equipment provides information on how to adjust, maintain and use all the necessary fittings, such as hoses, lances and nozzles. Finally advice is given on the actual operation of spraying by the various systems. An appendix gives formulae for required output and required tractor speed for automatic spraying.

323. (Williamson, H.)
Small sprayer uses new principle.
West. Fruit Gr, 1957, **11**(7): 21, illus.

The machine, suitable for small orchards, consists of a standard 500 gal. tank, a pump driven from the power take-off delivering 25–50 gal. per min. at about 500 lb. pressure, and a special nozzle assembly which combines fogging and jet nozzles to give a high-reaching fog pattern without the use of air fans.

324. Kearns, H. G. H., and Morgan, N. G.
Spray application problems: XXXVIII. A centrifugal spray pump. (With an 80 c.c. 2-stroke engine.)
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 147-50, bibl. 2, illus.

A specification is given of a simple lightweight spray machine consisting of a centrifugal pump mounted directly on the shaft of an 80 c.c. 2-stroke engine. The engine and pump are assembled in a simple tubular chassis, and have a total weight of 45 lb. The machine is well suited for unskilled users, as operation and maintenance are simple. [Authors' summary.]

325. Kearns, H. G. H., and Morgan, N. G.
Spray application problems: XL. A lightweight spray lance.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 153-6, bibl. 2, illus.

Suitable for one-hand operation with knapsack for use in market-garden, flower and glasshouse crops, strawberries and mushrooms, tea and tobacco.

Spray effects.

326. Luckwill, L. C.
Fruit set on Cox's Orange Pippin in relation to spray programme.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 61-5, bibl. 6.

The reduced cropping in 1956 of trees sprayed with lime-sulphur in 1955 and 1956 was shown to be due to: (a) the failure of a higher percentage of fruit buds to develop into normal blossom clusters, (b) an increased "first drop" of undeveloped flowers and small fruitlets, (c) an increased "late crop" (July 25th till harvest). The effect of lime-sulphur in reducing fruit set was relatively greater for filler trees on M.IX than for permanent trees on M.II. [From author's summary.]

327. Morgan, C. V. G., and Anderson, N. H.
Some aspects of a ryania-glyodin spray schedule in British Columbia apple orchards. I. Entomological, horticultural, and economic aspects.
Canad. J. Plant Sci., 1957, **37**: 423-33, bibl. 7.

Four applications of 100% ryania at 48 lb. per acre per application, with glyodin as the fungicide, gave control of light infestations of codling moth similar to that from 4 sprays of 50% DDT at 12 lb. per acre, with lime-sulphur, ferbam and wettable S. In a heavily infested orchard ryania was inferior to DDT. The ryania-glyodin schedule also controlled woolly apple aphid and green apple aphid. It has little detrimental effect on predacious mites; except for the apple rust mite (*Vasates schlechtendali*), phytophagous mites were usually less troublesome after ryania-glyodin sprays. Packing-house records showed that ryania-glyodin sprays resulted in reduced size and quality of McIntosh, Newtown and Delicious apples and reduced the size

Red Delicious. Grade of Red Delicious was better ter the ryania schedule than with the standard hedule. The 1954 application of the ryania schedule duced the size of the 1955 crops on all varieties; the ost seriously affected were McIntosh with 76·2% duction and Delicious with 53·7%.—Canad. Dep. gric., Summerland, B.C.

328. Porritt, S. W.
Some aspects of a ryania-glyodin spray schedule in British Columbia apple orchards. II. Effect on storage quality of McIntosh, Delicious and Newtown apples.
Canad. J. Plant Sci., 1957, **37**: 434-9, bibl. 4.
The effect of orchard sprays on storage quality of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 1.

n McIntosh apples maturity, as indicated by firmness nd respiration, appeared to be about the same for oth DDT- and ryania-sprayed lots; poor colour and avour, and the high incidence of core flush after orage, however, indicated immaturity in ryania-prayed fruits. Delicious and Red Delicious showed ttle difference in storage quality between the 2 treatents. Little difference in storage quality of Newtowns as observed at the early examinations; at the final xamination fruit quality of the ryania lot had deteriorted.—Canad. Dep. Agric., Summerland, B.C.

329. Hutton, K. E.
Reaction of stone fruit trees to fungicides.
Agric. Gaz. N.S.W., 1957, **68**: 357-9, 387, illus.

xperience on the damage likely to occur in New South ales from the use or mis-use of copper, sulphur and ganic fungicides on almonds, apricots, cherries, ectarines, peaches and plums is reviewed.

J.R.L.

Spray deposits and residues.

(*See also* 68t, 337s, x.)

330. Krentos, V. D., Batt, R. F., and Martin, J. T.
Spray application problems: XXXI. The determination of sulphur deposits on foliage.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 122-4, bibl. 8.

A description of a method used successfully in the case of lime sulphur deposits on apple foliage. It is designed for analysis of small leaf discs in distribution studies.

331. Martin, J. T.
Spray application problems: XXXII. Note on the determination of surface deposits of copper fungicides.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 125-6, bibl. 3.

A modification of the method for the determination of surface deposits of copper fungicides on small leaf discs is described. [Author's summary.]

332. Somers, E.
Studies of spray deposits. III.—Factors influencing the level of "run-off" deposits of copper fungicides.
J. Sci. Food Agric., 1957, **8**: 520-6, bibl. 9.

The deposits retained by artificial and leaf surfaces sprayed to beyond "run-off" have been investigated for bordeaux, burgundy, and cuprous oxide sprays, both with and without supplements. In no instance was the level of deposit found to be influenced by increased spraying beyond the "run-off" stage. It has been shown that at low concentrations representative wetting agents of anionic, cationic and non-ionic type slightly lowered the amount of deposit at "run-off"; at concentrations greater than those used in practice, serious reductions in deposit level were shown in some instances. The results emphasize the need, in spray formulation, for careful consideration of the type and concentration of wetting agent used. Supplements such as glycerol and gelatin, which increase the viscosity of the spray, produced no increase in deposit. In the absence of supplements, spray retention was found to increase with increasing spray concentration and with increasing wettability of the surface. [From author's summary. For parts I and II see *H.A.*, 26: 2671u and 27: 341.]—Long Ashton Res. Stat.

333. Batt, R. F., and Martin, J. T.
Spray application problems: XXXIII. The micro determination of DDT.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 127-30, bibl. 2.

A rapid micro-method, calibrated over the range 0–30 micrograms, for the determination of DDT on foliage and fruitlets and in soil and grain, is described. Experiments are reported on the recovery of DDT from soil. [Authors' summary.]

334. Fahey, J. E., Hamilton, D. W., and Rusk, H. W.
Effect of spray date on residues of chlorinated hydrocarbon insecticides on peaches.
J. econ. Ent., 1957, **50**: 366-7, bibl. 3.

Peach trees were sprayed with DDT, chlordane, heptachlor, dieldrin and endrin 10, 20, 30 and 40 days before harvest and residue determinations were made immediately after spraying, half-way between the spray application and harvest, and at harvest. The results are tabulated.—Ent. Res. Div., U.S.D.A.

335. Wallis, R. L., and others.
Malathion residues on vegetable, berry, and tobacco crops.
J. econ. Ent., 1957, **50**: 362-3, bibl. 3.

Malathion was applied in the field at $1\frac{3}{4}$ lb. per acre in dusts and in wettable powder and emulsion sprays. Samples of edible portions of leafy and fleshy vegetables, of berries and of fully developed tobacco leaves were harvested as soon as the sprays dried or within 1 hour of treatment and after longer intervals. It was found that residues were higher and remained longer on leafy vegetables and tobacco than on berries and fleshy vegetables. In general, the residues were about the same with the different formulations, but those from emulsions were reduced most quickly. Rain reduced residues.—Ent. Res. Branch, U.S.D.A.

336. Fahey, J. E., and Hamilton, D. W.
Demeton residues in peaches.
J. econ. Ent., 1957, **50**: 361.

Peaches, from trees treated with 0·75 pt. of demeton (26·2% active ingredient) per 100 gal., 21 days after spraying showed a 0·18 p.p.m. residue, which is less han the tolerance (0·75 p.p.m.) of demeton residues permitted in apples and pears.—Ent. Res. Branch, U.S.D.A.

Noted.

337.

a Anon.
Frost prevention.
Rur. Res. C.S.I.R.O., 1957, No. 20, pp. 13-17, bibl. 5, illus.
Research in Australia on heaters, fans, etc., reviewed.

b Anon.
L'irrigazione a pioggia come mezzo antigelo. (**Sprinkler irrigation for frost protection.**)
Inf. fitopat., 1957, **7**: 215-17, illus.
In northern Italian orchards.

c Baskett, W. J.
Trace element deficiencies in fruit trees and vines.
J. Dep. Agric. S. Aust., 1957, **60**: 475-81, 499, illus.
Diagnosis and treatment of Zn, Mn, Fe and Cu deficiencies.

d Blumer, S., and Bovey, R.
Über den virösen Besenwuchs an Apfelbäumen (*Proliferation virus*). (**The proliferation virus of apple trees.**) [French and English summaries 1 p. each.]
Phytopath. Z., 1957, **30**: 237-58, bibl. 18, illus.
Symptom expression in the nursery in the variety Schneiderapfel.

e Böhm, O.
Über Schnecken und Schneckenbekämpfung. (**On slugs and snails and their control.**) [English summary ½ p.]
PflSch. Ber. Wien, 1957, **19**: 111-29, bibl. 48, illus.
A review of the literature and an account of experiments with metaldehyde baits.

f Commonwealth Mycological Institute.
Common names of plant virus diseases used in the Review of Applied Mycology.
Suppl. Rev. appl. Mycol., 1957, Vol. **30**, pp. 78, 6s.
Prepared in co-operation with the American Phytopathological Society. An extremely useful compilation.

g Courshee, R. J.
Small volume spraying machinery for fruit trees. [French, German and Spanish summaries.]
J. agric. Engng Res., 1957, **2**: 198-208, bibl. 9, illus.

h Entomology Research Division, U.S. Agricultural Research Service.
Ants in the home garden: how to control them.
Home and Gdn Bull., U.S. Dep. Agric. **28**, revised 1957, pp. 11, illus.
Mainly with chlordane.

i Ford, D. H., and Wilhelm, S.
Fruit deformity of strawberry induced by a stigma-parasitizing fungus.
From abstr. in *Phytopathology*, 1957, **47**: 521.
A member of the Moniliaceae preventing fertilization.

j Fulton, J. P.
An evaluation of the use of excised leaf grafts in strawberry virus studies.
From abstr. in *Phytopathology*, 1957, **47**: 521.
As an aid to identification of viruses.

k Govi, G.
Maculatura parassitaria delle foglie di melo. (**Parasitic leaf spot of apples.**)
Ital. agric., 1957, **94**: 630-2, bibl. 3, illus.
Control measures generally adopted against scab are recommended for leaf spot (*Phyllosticta prunicola*).

l Govi, G.
Spaccature rugginose delle mele Stayman. (**Cracking and russeting in Stayman apples.**)
Frutticoltura, 1957, **19**: 607-9, illus.
Attributed to prolonged wet and misty weather following treatment with copper fungicides.

m Gualaccini, F.
A virus disease of sweet cherry in Italy.
FAO Plant Prot. Bull., 1957, **5**: 142-4, bibl. 3, illus.
Symptoms and indicators of a newly identified disease.

n Harrison, B. D.
Soil transmission of beet ringspot virus to peach *(Prunus persica)*.
Nature, 1957, **180**: 1055-6, bibl. 8.

o Kearns, H. G. H., and Morgan, N. G.
Spray application problems: XXXVII. A disc punch for sampling leaves for the assay of spray deposits.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 145-6, bibl. 1, illus.

p Kearns, H. G. H., and Morgan, N. G.
Spray application problems: XLI. Modifications of the Long Ashton ½-in. B.S.P. spray nozzle for special requirements.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 157-62, bibl. 2, illus.

q Lloyd, N. C.
Green peach aphid *(Myzus persicae)*.
Agric. Gaz. N.S.W., 1957, **68**: 410-12, illus.
Tar oil or DNC-oil in winter, DDT as a semi-dormant spray and malathion or parathion in summer are recommended for control. J.R.L.

r Madsen, H. F., and Hoyt, S. C.
***Schizura ipomaeae* Dbldy. attacking plums in California.**
J. econ. Ent., 1957, **50**: 284-7, bibl. 4, illus.
Control by DDT directed against young larvae in late May or early June.

s Mapother, H. R., and Batt, R. F.
Spray application problems: XXXVI. Benzene, toluene and naphtha formulations of spring washes.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 141-4, bibl. 4.
Deposits examined.

t Millikan, D. F.
Quantitative chlorophyll differences in peach leaves associated with infection by the phony peach virus.
From abstr. in *Phytopathology*, 1957, **47**: 529.

u Ministry of Agriculture, London.
Fruit tree capsid bugs.
Adv. Leafl. Minist. Agric. Lond. **154**, revised 1957, pp. 5, illus.
Plesiocoris and *Lygus* spp., mainly on apple and small fruits.

v Morrison, H. E.
Symphylids!
Market Grs' J., 1957, **86**(6): 14-15, illus.
Control of *Scutigerella immaculata*, a pest of vegetables and small fruits, with parathion or soil fumigation.

w Myburgh, A. C.
Control fruit fly by regular spraying.
Fmg S. Afr., 1957, **33**(8): 42-3.
Using malathion-sugar bait sprays.

Skerrett, E. J., and Baker, E. A.
Spray application problems: XXXIV. The determination of spray deposits of chlorobenzilate.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 130-4, bibl. 3.

Steinhaus, E. A., and Smith, R. F.
Annual review of entomology Vol. 1, 1956, pp. 466, and ***ditto Vol. 2***, 1957, pp. 407. Annual Reviews Inc., Stanford, Calif., U.S.A.
Containing respectively 22 and 21 review articles.

z Tilemans, E. M.
Quelques insecticides nouveaux et applications récentes. **(Some new insecticides and recent applications.)** [Flemish summary 4 pp.]
Bull. agric. Congo belge, 1957, **48**: 657-95, bibl. 22.
A comprehensive review.

338.

a Tirelli, M.
Il significato e l'uso delle statistiche fitosanitarie. **(The significance and use of plant protection statistics.)**
Progr. agric. Bologna, 1957, **3**: 562-6, illus.
Optimal theoretical and optimal economic protection.

b Tissot, A. N.
Control of moles.
Circ. Fla agric. Exp. Stats **S-86**, 1955, pp. 8, illus.
By trapping or digging out.

c Tissot, A. N.
Control of the pocket gopher or "salamander".
Circ. Fla agric. Exp. Stats **S-87**, 1955, pp. 10, illus.
By trapping and poisoning.

d Watson, C. C.
Determination of *p*-chlorobenzyl *p*-chlorophenyl sulfide (chlorobenside) and *p*-chlorobenzyl *p*-chlorophenyl sulfoxide (chlorobenside sulfoxide) residues on apples.
J. agric. Food chem., 1957, **5**: 679-81, bibl. 11.

e Whitehead, V. B.
Control of olive scale on apricot trees.
Dec. Fruit Gr, 1957, **7**: 122-3, illus.
With winter oil or malathion.

WEEDS AND WEED CONTROL.

General.

(*See also* 389e, h, i, 662, 984.)

39. Forrest, J. D., and White, J.
Chemical weed control in horticulture. Some preliminary trials under south-west Scotland conditions.
Res. Bull. W. Scot. agric. Coll. **20**, 1957, pp. 25, bibl. 47.

is is a comprehensive account of 2 seasons' work
th 15 herbicides in various horticultural crops.
he main observations so far are: (1) *Row crops*
rnip, aster, carrot, parsley, onion, rhubarb, lettuce
d beetroot]: PCP at 2–4 lb. per acre did not prove
itable for use as a pre-emergence herbicide. Light
neral oils at 80 gal. per acre gave good control of
nual weeds in carrots. (2) *Fruit crops* [strawberry]:
4-DES at 2–4 lb. per acre did not prove a satisfactory herbicide for use on strawberries. (3) *Grass:* 2,4-D proved more effective than MCPA for the control of common lawn weeds but it is essential to maintain a vigorous sward by cultural methods. MH restricted the growth of rough grass but also scorched finer grasses. (4) *Total herbicides* [for uncropped land]: So far the most promising of these is a combination of sodium borates, 2,4-D and monuron."

340. Baker, L. O., and others.
Weed control in Montana.
Circ. Mont. agric. Exp. Stat. **210**, 1956, pp. 36.

Among the many subjects covered by this publication are: the main perennial and annual weeds found in Montana and the most effective ways of controlling them; weed control in lawns, both new and established; weed control in vegetable crops, strawberries and conifer nurseries; the control of aquatic weeds and undesirable woody plants; methods of soil sterilization; spraying equipment and calibration; and notes on herbicides.

341. (Pridham, A. M. S.)
Poison ivy can be killed with ease if prompt action is taken.
Flor. Exch., 1957, **129**(6): 12.

Excellent control of poison ivy has been obtained with amino triazole applied in early summer at 2–4 lb. per acre. Late summer treatments are less effective. Good control may also be obtained with a commercial mixture of 2,4-D and 2,4,5-T, or with ammonium sulphate. In limited areas pulling up the vines in early spring is often the most efficient method.—Cornell Univ.

342. Warren, J. C. R.
Experimental herbicide—3Y9.
Proc. 10th Mtg west. Sect. nat. Weed Cttee, Canada, 1956, 1957, pp. 44-45, and *Proc. 10th Mtg east. Sect. nat. Weed Cttee, Canada, 1956*, 1957, pp. 32-3.

Tris(2,4-dichlorophenoxyethyl)phosphite proved particularly injurious in 1956 owing to rain washing it into the soil as the crop seeds were germinating. [For an earlier account on 3Y9 see *H.A.*, 27: 389.] Preliminary results obtained include the following: asparagus—better than monuron; peas and beans—damaged by 2 lb./ac. pre- and post-emergence; cucumber, onion, carrot, lettuce and spinach—damaged by 2 lb. pre-emergence; tomato and cabbage—damaged by 2 lb. post-emergence; crabgrass [*Digitaria* spp.] in turf—good results at 6 lb.; strawberries—better than 2,4-DES at 2–4 lb., though some evidence of runner inhibition. —From *Weed Abstr.*, **6**, No. 1337.

343. Pearse, F. S.
Dalapon—a progress report.
Proc. 10th Mtg east. Sect. nat. Weed Cttee, Canada, 1956, 1957, pp. 25-6.

The use of dalapon for control of grasses is considered to be promising in asparagus, apple, pear, peach, trellised vine and raspberry crops.—From *Weed Abstr.*, **6**, No. 1334.

344. Morgan, M. J., Rasmussen, L. W., and Wolfe, H. H.
Better weed control by applying correct rate of weed killer.
Ext. Misc. Publ. St. Coll. Wash. **44**, 1957, pp. 3.

The importance of applying the correct rate of herbicides is stressed and a graph is given showing how to find the amount of herbicide required for mixing a spray of the right strength.

Control of aquatic weeds.

(*See also* 389k.)

345. Grigsby, B. H., Hamilton, R. H., and Smith, J.
A new approach to the control of certain aquatic vegetation.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 30-1.

Complete control of *Myriophyllum exalbescens* was obtained by 2,4-D pellets at a rate equivalent to 20 p.p.m. applied on the ice of a frozen lake about 2 weeks before the ice broke up. Pellets at a 10 p.p.m. rate gave only 15% control, and 2,4-D liquid at a rate equivalent to 20 p.p.m. was ineffectual.—*Weed Abstr.*, **6**, No. 1342.

346. Bruns, V. F., and Wolfe, H. H.
Ditchbank weed control in Washington.
Ext. Bull. St. Coll. Wash. **521**, 1957, pp. 14, illus.

Cultural, mechanical and chemical methods of control are discussed in general, and line drawings of 24 species with individual recommendations for their control are given.

Weed control in fruit crops.

(*See also* 193, 389j.)

347. Agronomy Division, Tasmanian Department of Agriculture.
Weed control: recent developments.
Tasm. J. Agric., 1957, **28**: 259-62, illus.

Recommendations are made for controlling weeds in strawberries, red and black currants, raspberries and brambles, using dalapon, 2,4-D, DNBP or PCP. Grasses and white clover can also be controlled around the base of apple and pear trees with dalapon at 10–20 lb./acre, and this compound has also proved effective against several grasses and reeds in other situations. J.R.L.

348. Harrison, T. B.
Chemical grass control in the apple orchard.
Down to Earth, 1957, **13**(2): 14-15, illus.

Annual spring treatments with Dowpon (dalapon, sodium salt 85%) in the apple orchard were effective in controlling perennial grasses without any evidence of phytotoxicity. Grass control in the trunk area was obtained by application of a solution of 5 lb. Dowpon in 100 U.S. gal. water, at 1 quart per tree. For grass control in the mulch area beneath a tree, 2·5 gal. of the solution should be used per tree.—Exp. Fm, Harrow, Ont.

349. Campbell, A. I.
Killing the weeds that choke black currants.
Grower, 1957, **48**: 1022-3, illus.

Convolvulus arvensis and *Calystegia sepium* have been successfully controlled in black currants by 2,4,5-TB, without damage to the bushes. The spray was applied immediately after picking and a concentration of 1,000 p.p.m. was found best. A further spray may be necessary the following year.

350. Dana, M. N.
Selective herbicides for cranberries.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 63-4, bibl. 2.

Cranberries treated with dalapon at 6, 12 and 18 lb./ac. at 40 gal./ac. on 16th October, 1954, for the control of *Carex rostrata* failed to crop in 1955 owing to blossom abnormality, but in 1956 produced yields which exceeded the combined yields of 2 years from untreated plots. The triethanolamine salt of 2,4-D at 1·3 lb./ac. in 250 gal. applied to cranberries in the white bud stage gave 95% control of *Ambrosia artemisiifolia* without

mage to crops. Applied at 0·75 lb./ac. when cran-
ry shoots were 0·25 in. long, it killed *Bidens connata*
dlings having 6 true leaves but caused serious damage
vines and loss of the crop. Cranberry vines treated
h amino triazole at 1–4 lb./ac. developed pinkish
ite new growth when treated any time from the start
growth to shortly after blossom stage. Blossom and
it were not affected and the shoots turned green
weeks after treatment and developed normally.
es treated later than August 1st with rates up to
lb./ac. showed no injury. Weeds controlled by
apon and amino triazole are listed.—From *Weed*
str., **6**, No. 1316.

51. CAMPBELL, R. W., AND ATTERIDG, G. S.
Comparison of some chemicals applied as residual pre-emergence sprays to control common crabgrass in established strawberry plantings.
Proc. 13th N. centr. Weed Control Conf., *1956*, pp. 62-3.

buron at 4 lb./ac. in 80 gal. and 2,4-dichlorophenoxy-
anol (granular) at 2 lb./ac., both applied 3 times
25th June, 18th July and 23rd August to a second-
r planting of Premier strawberries, gave 93 and 89
an % control of common crabgrass [*Digitaria* sp.].
e August treatment with neburon caused temporary
orosis of strawberry leaflets. Applications of
-DES and 2 formulations of 2,4-D gave less satis-
tory results. Control in general was best after the
treatment.—From *Weed Abstr.*, **6**, No. 1380.

2. MORRISON, G.
Geese aid in weeding strawberry acreage.
Amer. Nurserym., 1957, **106**(7): 15, 58-61, 64, illus.

escription is given of the method used in a 70-acre
chigan strawberry nursery of combining the use of
se with cultivation and herbicide spraying for
cient weed control. Young birds of the White
inese breed were more satisfactory than any other
e.

53. HOPKINS, W. L.
Weed control with new chemicals.
Proc. 11th annu. Res. Conf. Calif. Fig Inst., Fresno, 1957, pp. 8-10.

e soil sterilants Chlorea, Erbon, Ureabor and
nuron are recommended for the control of annual
d perennial weeds on the ditch banks of irrigated
orchards. The urea herbicides and dalapon have
en tested in fig orchards as selective herbicides and
ve successfully controlled the weeds, but more data
possible tree injury are required before they can be
commended. J.R.L.

54. HEMPHILL, D. D.
Chemical weed control in vineyards.
Proc. 13th N. centr. Weed Control Conf., *1956*, pp. 64-5, bibl. 2.

PC or (1-chloropropyl-α)-N-3-chlorophenylcarba-
ate at 14 lb./ac. gave satisfactory broadleaf weed and
ss control with no crop injury. Diuron at 2 lb./ac.
s also satisfactory and unlike monuron and oil
tified with dinoseb was not injurious to young
nsplants. No treatment decreased yields; all were
plied before weed emergence.—*Weed Abstr.*, **6**,
. 1317.

355. TROUILLON, L. L.
Un parasite de la vigne: L'osyris. **(A parasite of the vine: osyris.)**
Phytoma, 1957, No. 85, pp. 36-7, illus.

Osyris (*Osyris alba*) is a parasitic plant of the South of France whose roots attach themselves by means of suckers to the roots of woody plants such as vine, olive and evergreen and Kermes oaks. Considerable damage is caused to hillside vines, especially in dry years. Attacked vines die in 2 or 3 years. For control burning was found unsatisfactory and digging a ditch round the affected part too costly. Good results have been obtained with 3 spray treatments of DNC applied, without touching the vines, in April, June and September. After 2 or 3 years it is advisable to repeat the treatment.—From *Weed Abstr.*, **6**, No. 1231.

Weed control in ornamentals.

(*See also* 389c, g.)

356. BIVINS, J. L., HARVEY, W. A., AND FOSTER, N. H.
Chemical weed control tests.
Calif. Agric., 1957, **11**(9): 12, 14-15, illus.

In trials on seed crops of alyssum, antirrhinum, larkspur, petunia, sweet pea and verbena excellent control of annual weeds and increases in the yields of flower seeds followed pre-emergence applications of Vapam, pre-emergence dinitro-methyl bromide and Shell 20. Other compounds either gave inferior weed control or injured the flower crops.—Univ. Calif., Davis, etc.

357. TAYLORSON, R. B., AND HOLM, L.
Weed control in conifers.
Proc. 13th N. centr. Weed Control Conf., *1956*, p. 65.

CIPC 10 lb. + potassium cyanate 20 lb./ac. and monuron 0·75 lb./ac. + endothal 10 lb./ac. applied in April gave 90 and 80–90% control respectively of *Bromus tectorum* into September without causing injury to spreading juniper [*Juniperus* sp.? *horizontalis*]. Monuron 0·75 lb. + potassium cyanate 20 lb./ac. gave little or no control and caused no injury. In further trials mixtures of monuron + CIPC or dalapon and of CIPC + dalapon were shown to be more effective in controlling *B. tectorum* than the component chemicals applied alone.—*Weed Abstr.*, **6**, No. 1324.

358. BAGLEY, W. T., AND LOERCH, K. A.
Diuron for weed control in new windbreak plantings.
Proc. 13th N. centr. Weed Control Conf., *1956*, pp. 66-7.

A report on the effect of diuron at 8, 16 and 32 lb. in 80 gal. water/ac. applied in late April in a 1·5 ft. band over newly-planted trees. Russian olive (*Elaeagnus angustifolia*) suffered high mortality at all rates; Siberian elm (*Ulmus pumila*) and hackberry (*Celtis occidentalis*) were also highly sensitive, but a proportion recovered from the 8 lb. rate. Eastern red cedar (*Juniperus virginiana*) still showed injury in September on 72% of those treated at 32 lb./ac., but only 18% of those treated at the lower rates were still chlorotic. Honey locust (*Gleditsia triacanthos*) and green ash (*Fraxinus pennsylvanica*) were highly resistant to permanent injury at all levels. The two higher rates gave nearly perfect control throughout the season of a large variety of weeds.—From *Weed Abstr.*, **6**, No. 1325.

Weed control in tropical and sub-tropical crops.

(*See also* 389b, d, 756.)

359. Mune, T. L., and Parham, J. W.
The declared noxious weeds of Fiji and their control.
Bull. Dep. Agric. Fiji **31**, 1956, pp. 73, bibl., illus.

Notes on 15 species, all of which are very well illustrated, concern scientific and popular names, general and botanical descriptions, importance as weeds, and methods of cultural, chemical and biological control.

360. Pfeiffer, R. K.
The first East African herbicide conference. IV. General aspects of chemical weed control in tropical and sub-tropical countries.
E. Afr. agric. J., 1957, **23**: 25-8.

Weed control in general is discussed with emphasis on the use of selective herbicides, and it is contended that in tropical agriculture weeds are more important as a limiting factor than in temperate climates and often present a greater problem than pests and diseases. [See also *H.A.*, 26: 3599.]

361. Duthie, D. W.
The first East African herbicide conference. II. Summary of papers and discussion.
E. Afr. agric. J., 1957, **23**: 6-21, bibl. 26.

Of 21 papers presented at this conference, 1 on the use of herbicides in pyrethrum and 2 in sisal have been abstracted earlier [see *H.A.*, 27: 3365, 3367 and 3368]. Other subjects of interest are weed control in coffee and pineapple with *Digitaria scalarum* as the main problem in both crops; weed control in sugar cane, where again grasses presented the greatest difficulty; and control of water weeds in irrigation canals.

362. McCarty, C. D., and Day, B. E.
Evaluation of monuron as a selective herbicide for use in avocado orchards.
Yearb. Calif. Avoc. Soc. for 1957, pp. 128-32, bibl. 2, illus.

Experiments carried out in the greenhouse at Riverside indicate that the resistance of avocadoes to monuron is similar to that of citrus. In field tests soil applications at rates up to 50 lb. per acre of the commercial formulation (80% active ingredient) caused no injury, though it is likely that injury will ultimately occur at the higher rates. Drenching sprays on the foliage at 4 lb. per 100 gal. caused burn on both young and mature leaves. While the amount of monuron required to prevent the establishment of weeds in avocado orchards depends on soil type and condition, a 2 lb. per acre rate is generally considered to be suitable and safe.

363. Day, B. E.
The Bermuda grass problem in citrus and avocado orchards.
Proc. 9th Calif. Weed Conf., 1957, pp. 22-5.

Dalapon at 3–10 lb./ac. controlled Bermuda grass [*Cynodon dactylon*] without causing injury to non-irrigated and non-cultivated mature lemon and orange trees. Rates above 10 lb./ac. caused injury. Citrus trees have shown a wide variation in response to amino triazole, injury being reported at 8–12 lb./ac. It is stated that a single application of 8–16 lb./ac. amino triazole should give lasting control of Bermuda grass. The addition of monuron to amino triazole accelerated the development of amino triazole injury symptoms and also the recovery of normal growth. Dalapon was more effective alone than in combination with amino triazole.—From *Weed Abstr.*, **6**, No. 1315.

364. Armstrong, W. W., Jr.
Trial of several herbicides for control of nutgrass in Coachella Valley, California.
Rep. 34th Annu. Date Grs' Inst., Coachella, 1957, pp. 10-11, bibl. 11.

Nutgrass, *Cyperus* spp., often forms dense sods in date gardens, but older deep-rooted palms do not appear to suffer from this competition. When old palms are grubbed, however, the nutgrass may have to be eradicated before the land can be used for other permanent crops. Several trials with herbicide and fumigants are outlined. The most effective material used was monuron at 150 and 300 lb./acre, but it did not eradicate nutgrass. 2,4-D, though better than MCPA and 2,4,5-T, did not give adequate control. Sodium chlorate, TCA and allyl alcohol were failures. CET and CDT as sprays and D-D as a soil drench deserve further trial.—U.S. Date Field Stat., Indio, Calif.

365. Constable, D. H.
A new grass killing mixture.
Pestic. Abstr. News Summ., 1957, **3**: 203-4, bibl. 1.

When at the Rubber Research Institute of Ceylon an accidentally made up mixture of amino triazole and PCP was applied to grasses, burn was apparent within 24 hr, was complete in a week and lasted for 3 months, and regeneration thereafter was largely of species originally absent or dormant. In small-scale trials the mixture has given good control of mixed grasses. It should be used at 40 gal./ac. containing 2–4 lb. of amizole and 2–4 gal. of 12% PCP (as Shell P12) plus a small quantity of wetting agent.

366. Chow, N.-P., Sze, W.-B., and Chao, T.-T.
Studies on the use of chemical weedkillers in the sugarcane fields of Taiwan. (Second report.) [Chinese, with English summary 1¼ pp.]
Rep. Taiwan Sugar Exp. Stat., 1956, No. 14, pp. 16-35, bibl. 8, illus.

CMU [monuron] sprays provided complete control of most noxious weeds without any harmful effects on cane. There was some evidence that CMU improved germination and stimulated tillering and growth in the young canes. It was effective for 2½–3 months after application. It is, however, too expensive. 2,4-D controlled broad-leaved weeds effectively under favourable conditions and killed the top growth of nutgrass and retarded regrowth. Mainly because of its low cost it is considered to be the most promising herbicide tested, but it sometimes had a detrimental effect on the germination of setts, particularly if the pre-emergence spray was followed by heavy rain. Pre-emergence sprays of TCA were as effective as those of 2,4-D if used at relatively high concentrations, but they were expensive. Agroxone-3 (MCPA), while safer to than 2,4-D, also proved too expensive. Kanex CP) was not very satisfactory. It was found that ssive or insufficient rainfall after spraying badly ited the effectiveness of the herbicides, but delaying initial spraying until after the first inter-cultivation not recommended. [For first report see *H.A.*, 2772.]

J.R.L.

7. ROCHECOUSTE, E.
Weed control.
A.R. Mauritius Sugar Ind. Res. Inst. 1956,
pp. 61-71, illus.

urther studies on urea herbicides there were indica- ns that DCMU was more effective than CMU in er-humid localities; at rates up to 10 lb./arpent* ed control was unsatisfactory after 4 months; split atments at 2-month intervals gave better weed kill n single applications at the same rate. In trials h new herbicides U_{46} Special (butyl glycol ester of -D and 2,4,5-T) gave promising results.

8. MESTIER, J. J. E.
Weed control with the use of herbicides in St. Kitts sugar cane fields.
Proc. 1955 Mtg B.W.I. Sugar Tech.,
pp. 42-4, bibl. 2.

tachlorophenol and the amine salt of 2,4-D mixed gether have been recommended for the initial pre- ergence treatment, and the amine salt of 2,4-D ne for subsequent treatments. Satisfactory control weeds can be obtained by 3 or 4 applications of bicides at intervals of 5 to 7 weeks. [From author's mary.]—St. Kitts Sugar Ass.

9. STEWART, M. J.
Successful weed control in dry areas.
Proc. 31st annu. Congr. S. Afr. Sugar Tech. Ass., summarized in *S. Afr. Sugar J.*, 1957,
41: 463.

y weather following the application of pre-emer- nce sprays is often responsible for poor performance. ry areas treatment is best postponed until the weeds rt to germinate. On one field where this was tried spray of 2 pt. Phordester (2,4-D ester, 4 lb. acid uivalent/gal.) plus 3 gals. Pecepan (5% PCP in matic oil) in 45 gal. water per acre, a fortnight er the cane was planted, followed by spot spraying weeks later gave very good results.

J.R.L.

70. STEWARD, E.
The control of weeds in plant cane by chemical spray.
Proc. 30th annu. Congr. S. Afr. Sugar Tech. Ass., 1956, pp. 125-9, bibl. 3.

e comparative costs of the methods tested to control eds on one farm in Natal are given. The selective rbicide 2,4-D and the non-selective PCP were used various concentrations. It is concluded that so long cheap labour is available the cost of clearing by hand eding is about the same as that of hand weeding mbined with spraying.

J.R.L.

Weed control in turf.

371. HEMPHILL, D. D., AND HOGARD, T. W.
Control of 2,4-D-resistant broadleaved lawn weeds.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 46-7.

Ammonium sulphate at 2 lb./100 sq. ft. gave 93% control of *Stellaria media* when applied in March and 100% control applied on 27th October. It also gave satisfactory control when applied in crystalline form to the wet foliage on 8th June. Discoloration of bluegrass, which disappeared after 4 weeks and after 1 mowing, resulted from the spring treatment but not from the autumn. 2,3,6-TBA at 4 lb./ac.+1% sticker gave 96% control applied in October and when applied in June 100% control, as also 90% control of *Lamium amplexicaule*. 2,4,5-TP (ester) at 1·66 lb./ac.+1% sticker applied in the spring gave 100% control of both *S. media* and *L. amplexicaule*. 2,4,5-T (ester) at 3 lb./ac. gave very good control of both weeds, but caused excessive turf injury. Of a number of chemicals applied on 29th June for the control of white clover 2,4,5-TP and 2,4,5-T (ester) gave 100% control and 2,3,6-TBA 90%, all at 2 lb./ac. *Polygonum* spp. also appeared somewhat susceptible to 2,3,6-TBA. Sodium arsenoacetate at 2·7 lb./ac., endothal at 1·5 lb./ac., and Methar at 8·3 lb./ac. were unsatisfactory.—*Weed Abstr.*, **6**, No. 1406.

372. GOETZE, N. R., AND DANIEL, W. H.
Miscellaneous weed control in turf.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 47-8.

In tests for the control of *Stellaria media*, *Polygonum aviculare* and *Poa annua*, neburon at 4 lb./ac. gave much the most promising results against all 3 weeds, though the response was slow in developing. Complete control of *P. aviculare* was obtained.—From *Weed Abstr.*, **6**, No. 1409.

373. HOGARD, T. W., AND HEMPHILL, D. D.
Crabgrass control studies.
DAVIS, R. R.
Crabgrass control in bluegrass turf.
TAYLORSON, R. B., ROM, R. C., AND DANA, M. N.
Crabgrass control in Wisconsin.
STADTHERR, R. J., AND NYLUND, R. E.
Crabgrass control in bluegrass lawns.
GOETZE, N. R., AND DANIEL, W. H.
Crabgrass control studies.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 42-3, 42, 44, 45, and 45-6 respectively.

In the first 4 papers results are given of pre- and post-emergence applications to lawns of a large number of herbicides, while in the last one the relative merits and demerits of the 2 types of treatment are discussed.—See *Weed Abstr.*, **6**, Nos. 1374-1378.

374. DAY, B. E., AND HEMSTREET, C. L.
Selective weed control in *Dichondra* turf with CMU.
Lasca Leaves, 1956, **6**(4): 83-7.

Pot and field tests at Riverside showed that mature *Dichondra* turf, sprinkler irrigated every day, would tolerate monuron 4 lb./ac. (80% product) with only temporary injury, and that the effect of 8 lb./ac. was outgrown in 2 months; seedling *Dichondra* was as sensitive as the weeds. An experiment in boxes showed that if monuron were washed off the leaves into the soil immediately after application there was no injury, while if it were left on considerable leaf injury was caused. *Gnaphalium spathulatum* appears to be markedly sensitive to monuron.—*Weed Abstr.*, **6**, No. 1308.

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* 1 arpent = 0·42209 ha. or 1·043 acres.

375. DAVIDSON, J. H.
Methyl bromide as an aid in producing weed-free turf.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 40-1.

A description of the old and new ("hot" gas) methods of applying methyl bromide and its use as a herbicide for (1) treatment of graded and cultivated soil prior to seeding, (2) turf renovation, and (3) treatment of top dressing soil prior to use on turf. A 6-hour exposure to "hot" gas has given equal or better weed control than a 24-hour exposure to gas produced in evaporating basins. The "hot" gas method consists of passing liquid methyl bromide through a coil of copper tubing surrounded by water at 170° F. and feeding the vapour by 0·75 in. polythene pipes to release points near the corners of the cover.—*Weed Abstr.*, **6**, No. 1307.

376. POLIVKA, J. B.
Effect of chlordane on broomsedge when applied to turf for control of Japanese beetle grubs.
J. econ. Ent., 1957, **50**: 360.

Chlordane applied at from 0 to 25 lb. per acre for the control of Japanese beetle grubs in a golf course reduced the stand of broomsedge, *Andropogon virginicus*, progressively according to rate of application from 100 to 5%.—Ohio agric. Exp. Stat., Wooster.

377. SYLWESTER, E. P.
Dandelion control as affected by temperature.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 48-9.

MCPA, 2,4-D (amine) and 2,4-D paste, all at 1 lb./ac., were applied to dandelions at weekly intervals from 6th April to 4th May. The 4th May treatment gave 90–95% control, and the earlier treatments from 10% (6th April) to 80% (27th April). MCPA was less effective than the 2,4-D formulations except at the last date.—*Weed Abstr.*, **6**, No. 1410.

Weed control in vegetables and tobacco.

(*See also* 389a, f, g, 397, 418.)

378. AULTMAN, D. A.
Chemical weed control tests with vegetables.
Miss. Fm Res., 1957, **20**(3): 3.

Preliminary tests showed that tomatoes and capsicums were very susceptible to injury by natrin, but that it might be possible to use low rates, less than 2 lb. per acre, 10 days after transplanting. Pre-emergence applications of CIPC and DNBP to snap beans gave good weed control for 3–4 weeks; CIPC at 4 lb. per acre also gave good results when applied after the last ploughing. Pre-emergence applications of 2,4-D, DNBP and CIPC caused serious injury to turnip greens; NPA was less harmful, but weed control could not be evaluated.

379. ALBAN, E. K.
Chemical weeding of vegetable crops—1957.
42nd annu. Proc. Ohio Veg. Grs' Ass., 1957, pp. 72-80.

Recommendations are made in tabular form for weed control in several vegetable crops, giving in most cases a choice of herbicides, and time, rate and method of application. Another table lists chemicals, crops in which they may be used and types of weed they control. Newer promising materials are mentioned.

380. GUZMAN, V. L.
Weed control investigations in vegetable crops.
A.R. Fla agric. Exp. Stats, 1955–56, pp. 221-2.

Excellent weed control in vegetables was obtained with 4–8 lb. per acre of CDEC, CDAA, CDIC, CP9802 and combinations of CIPC with CDEC. Beans, Southern peas, brassicas, celery, okra and onion were tolerant to these herbicides. CP9802 at 4 lb. per acre was excellent for weed control in capsicums, tomatoes, eggplants, spinach and cucurbits. CIPC (4 lb.) plus CDEC (2 lb.) gave good weed control in lettuce, endive, cauliflower, swedes, carrots, parsley, okra and spinach. CDEC at 4 lb. applied to cabbage pre-emergence or 1 day after emergence gave excellent weed control and had no effect on yields. In onions good weed control was obtained by pre-emergence treatment with 8 lb. CDEC, or with 10–12 lb. CIPC followed by post-emergence applications of 10, 20 and 30 lb. CIPC. Applications of 8 lb. CDEC, CDAA or CDIC gave excellent control of weeds and grasses when applied just before or just after transplanting celery.

381. EHLERS, M.
Kombinationsversuche mit CIPC und CMU zur Unkrautbekämpfung in Gemüsekulturen. (**Studies with CIPC and CMU combined for weed control in vegetables.**) [English summary 9 lines.]
Z. PflKrankh., 1957, **64**: 479-84, bibl. 5.

By using a combination of CIPC and CMU the herbicidal range of CIPC was widened and a build-up of a CIPC-resistant weed population was prevented. In carrots the combined spray gave weed control almost equal to that of mineral oils.

382. WELKER, W., RAKE, L., AND HOLM, L.
The tolerance of several vegetable crops to preplanting treatment of dalapon.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 59-60.

Dalapon 4, 12 and 36 lb./ac. applied on 1st May showed the following effects on 10 different crops planted 2, 3 and 4 weeks after treatment. Peas showed severe injury except from those sown 4 weeks after the 4 lb. rate. Snapbeans, cucumbers and cabbage showed moderate injury except at the 4 lb. rate when cabbage showed no injury, snapbeans no injury when planted 4 weeks after treatment, and cucumbers no injury when planted 3 or 4 weeks after treatment. Tomatoes and peppers showed slight injury from all treatments except the 4 lb. rate when planting was 3 or 4 weeks r, but they recovered and showed no difference n harvested. Beets showed complete tolerance at the rates. Symptoms of injury are described.—m *Weed Abstr.*, **6**, No. 1312.

3. Ries, S. K.
The effect of fertilizer applications on quackgrass control with dalapon treatments before planting vegetables.
Proc. 13th N. centr. Weed Control Conf., 1956, pp. 60-1, bibl. 4.

apon was applied to an area infested with *Agropyron* *ens* once on 10th May when *A. repens* was 4–6 in. h, at 4·2, 8·5 and 17·0 lb./ac., and once on 19th e at 4·2 and 8·5 lb./ac., and at 4·2 and 8·5 lb./ac. ce on 10th May and 19th June. Ammonium ate (33% N.) at 121 lb./ac. and 12–12–12 fertilizer 333 lb./ac. had been applied on 5th April. The was ploughed on 21st May. On 21st June it was lized with 5–20–20 at 400 lb./ac., and 4 days later o MR-17 pickling cucumbers and Improved dergreen snap beans were planted. Economic trol of *A. repens* was obtained only with the 17 lb. applied 10th May, the 8·5 lb. rate applied 19th e, and the 2 applications at 8·5 lb./ac. The double lications of 4·2+4·2 and 8·5+8·5 lb./ac. were no ter than one application of 8·5 lb. on the later date. er control was obtained in the plots fertilized a nth before treatment, and no difference between effect of the 2 fertilizers was noticed. The addition 0 lb. of P_2O_5 and K_2O did not increase control. injury resulted to either crop, but heavy rainfall warm temperatures favouring dalapon breakdown rred in the early part of the season.—*Weed Abstr.*, o. 1383.

4. Jasmin, J. J.
Preliminary herbicide trials—1956.
Proc. 10th Mtg east. Sect. nat. Weed Cttee, Canada, 1956, 1957, pp. 28-31.

number of comparatively new herbicides were ed pre- and post-emergence on a variety of crops. sults include: sec-butyl N-(3-chlorophenyl) carate, pre-emergence at 6 lb./ac., caused stunting of ize, lettuce, spinach, carrots and cucumbers; hloropropyl-2) N-(3-chlorophenyl) carbamate gave to similar reactions; DCU appeared to have a eficial effect on cabbages.—*Weed Abstr.*, **6**, No. 1333.

5. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med ukrudtsbekaempelse på forskellige tidspunkter i aerter. **(Experiments on the timing of herbicidal sprays for peas.)**
Medd. St. Forsøgsvirks. Plantekult. **570**, 1957, pp. 2.

st results were obtained with applications of 4 litre % dinoseb per hectare when the pea plants were 5 cm. high. The experiments were carried out at Danish stations for 2 years.

6. Wilhelm, S., Benson, L. C., and Sagen, J. E.
Methyl bromide gives promising control of broomrape.
From abstr. in *Phytopathology*, 1957, **47**: 537-8.

Orobanche ramosa, a serious parasite on lettuce and tomato in California, was satisfactorily controlled by soil fumigation with methyl bromide applied under polythene tarpaulins at rates above ½ lb. per 100 sq. ft. No control was obtained with other soil fumigants and herbicides tested. Infection was reduced by deep ploughing to bury the seed.

387. Izard, C., and Hitier, H.
Nouvelles recherches sur la germination des graines de l'orobanche parasite du tabac. **(Further studies on germination of seeds of the broomrape parasite of tobacco.)**
Ann. Inst. exp. Tabac Bergerac, 1954, **2**(1): 9-13, bibl. 2 [received 1957].

Magnesium sulphate solutions with a concentration range of 10^{-7}–10^{-14} brought about germination of *Orobanche ramosa* seeds *in vitro*, the highest response being 60% germination at 10^{-5}. Similar results were obtained with magnesium carbonate, showing that the action was not proportional to the concentration of Mg ions. The sulphate, tested at 10^{-3} and 10^{-2}, proved toxic. It is suggested that infested tobacco soils might be treated with Mg salts either to germinate the broomrape seeds in the absence of the crop, or to inhibit their germination, provided the treatment proved harmless to the crop. [For earlier work see *H.A.*, 24: 402.]

388. Holdsworth, R. P., Jr.
Weed control in tobacco plant beds.
Agric. Newsl., 1957, **25**(4): 12-13, illus.

Tests have shown that weeds and weed seeds can be effectively killed in tobacco seedbeds by VPM fumigant (sodium methyldithiocarbamate) applied as a drench at 9 qt./100 gal. It is best applied in the autumn following rain, and additional water should be applied immediately after the fumigant drench to wash it into the soil and to act as a seal. On heavy soils, in which there is some risk of injury to the tobacco seedlings, the concentration can be halved and still provide adequate weed control.—E.I. du Pont de Nemours & Co.

Noted.

389.

a Alban, E. K.
Comparative costs of weeding onions with herbicides.
Proc. 13th N. centr. Weed Control Conf. 1956, pp. 61-2.
Reports on trials with CIPC and 2,4-D.—*Weed Abstr.*, **6**, No. 1313.

b Arakeri, H. R.
Chemicals to kill weeds.
Indian Fmg, 1957, **7**(3): 23-7, 40, illus.
Herbicides and their use, with notes on weed control in sugar cane, ginger, turmeric, etc.

c Bing, A.
Controlling weeds in the soil.
Bull. N.Y. St. Flower Grs, 1957, No. 137, pp. 3-4.
For ornamentals in general and gladiolus in particular.

d DAY, B. E.
Status of chemical weed control in citrus culture.
Calif. Citrogr., 1957, **42**: 415, 428, 430.
Herbicides in use and showing promise.

e DAY, M. W.
Killing undesirable trees—a comparison of methods.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 687-90, bibl. 1.
Labour requirements compared for 5 methods, using a girdling machine or herbicides.

f GUZMAN, V. L.
Volatility and drift of 2,4-D as a cause of damage to untreated sensitive plants.
Proc. Soil Crop Sci. Soc. Florida 1956, 1957, **16**: 283-93, illus.
Tomato used as test plant.

g HOGAN, W. D.
Herbicides for crop and industrial uses.
Proc. Soil Crop Sci. Soc. Florida 1956, 1957, **16**: 305-6.
For use in Florida crops, including gladiolus, asparagus fern and sugar cane.

h MERVYN, R. G.
The elimination of ground-elder.
J. roy. hort. Soc., 1957, **82**: 401-3.
Control of *Aegopodium podagraria* in gardens by digging and contact sprays of S.B.K.

i MINISTRY OF AGRICULTURE, LONDON.
Couch or twitch.
Adv. Leafl. Minist. Agric. Lond. **89**, revised 1957, pp. 5, illus.
Descriptions and control by cultivation and by TCA of *Agropyron repens*, *Agrostis gigantea*, *Agrostis stolonifera* and *Arrhenatherum elatius*.

j ROGERS, H.
Chemical weed control for grapes.
West. Fruit Gr, 1957, **11**(10): 27-8, illus.
Recommendations on the use of diuron (Karmex DW) to control seedling annual weeds in vineyards.

k TATE, H. D., AND O'BRIEN, G. E.
Dichlone as a control for algae and submersed aquatics.
Proc. 13th N. centr. Weed Control Conf., 1956, p. 30.
A brief review with notes on fish toxicity tests.—From *Weed Abstr.*, **6**, No. 1341.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1, 8, 12, 38, 53, 57, 67, 68d, n, 243, 335, 337v, 378-386, 534g, h, z, 535a, d, g, 987, 992, 1000, 1006, 1007, 1015f.)

390. WEBSTER, A. B.
Vegetable trials at Auchincruive.
Res. Bull. W. Scot. agric. Coll. **17**, 1956, pp. 24, 1s.

Detailed results are given of variety trials with British and European varieties of brussels sprouts, winter cabbage and savoys, broccoli, autumn cauliflower, french beans and carrots.

391. CRANG, A., AND STURDY, M.
A comparison of some varieties of vegetables preserved by canning and by freezing: Progress report V.
A.R. Long Ashton agric. hort. Res. Stat. for 1956, 1957, pp. 167-9, bibl. 2.

Concerns the value of 7 broad bean varieties for freezing and 15 French beans, 4 runner bean and 5 spinach varieties for canning and for freezing.

392. JEANNEAU, Y.
Conclusions pratiques sur quelques essais de cultures maraîchères de primeurs. (**Practical conclusions on some trials with early market-garden crops.**)
Fruits et Prim., 1957, **27**: 131-46, bibl. 1.

Varietal trials in the coastal region of western Algeria, including spring and autumn tomatoes, beans, egg-plants, strawberries and melons.

393. WARLEY, T. K., AND INGERSENT, K. A.
The use of labour in farm-scale vegetable production.
[*Publ.*] *Univ. Nottm Sch. Agric., Dep. agric. Econ.*, 1957, pp. 147, bibl. in text, illus., 10s.

The aim of this study was "to describe and appraise the use made of labour in vegetable production, with a view to obtaining information which would enable growers to achieve greater efficiency in labour organization and management". Data on 6 selected vegetable crops were obtained from general farms or, in the case of brussels sprouts, market gardens in the East Midlands area. The production of vining peas is already highly mechanized, and ways in which the labour requirement could be further reduced were not apparent; it is considered that only growers with considerable acreages in peas will find the purchase of specialized cutting machinery profitable. The labour requirements for growing pulling peas are relatively low, but labour is needed at a time when other crops demand attention: for weed control and fertilizer placement mechanization could be used more widely. Autumn cauliflowers make substantial demands on labour, but the use of mechanical transplanters has reduced labour requirements. The difficulties of mechanization in brussels sprout production necessitate high labour requirements, but piece-work picking may help to reduce labour demands. A comparison between sprout growing by farmers and market gardeners has shown that the latter use more labour in field cultivations and harvesting than farmers; in general small scale market gardeners compare unfavourably from the economic point of view with farmers. Savoy cabbage growing is also competitive for labour at busy times, but it may be ssible to obtain some reduction in labour requirents by using a down-the-row thinner as for sugaret, and selling the crop to a merchant for cutting. e high labour requirements for maincrop carrots may reduced by chemical weed control and by the aptation of mechanical sugar beet harvesters for use carrots.

94. Culbertson, R. E., Nakayama, T., and Hiramatsu, M.
Hydroponic vegetable production in Japan.
Market Grs' J., 1957, **86**(6): 16-19, illus.

formation is given on the soilless culture installations, volving 80 acres, operated by the U.S. Far East mmand in Japan. Vegetable varieties which have ne well are listed, and the costs and yields per acre hydroponic and soil culture are compared.

95. Ferguson, J. H. A.
Photothermographs, a tool for climate studies in relation to the ecology of vegetable varieties. [Dutch summary ½ p.]
Euphytica, 1957, **6**: 97-105, bibl. 17.

hotothermographs" have been developed to express climate, or the weather conditions during a certain riod, in respect of temperature and day-length. They ve been applied to illustrate the transition from the getative to the generative stage, and vice versa, for me varieties of red table beet and sugar beet. Further velopment of this method may contribute to the ediction of the productivity of a variety in a certain ion.—Inst. hort. Plant Breeding, Wageningen.

6. Krotova, O. A.
Ultrasonic treatment of seeds. [Russian.]
Sad i Ogorod, 1957, No. 9, pp. 28-9.

is stated that ultrasonic treatment of seeds improves nt growth and increases yields. In trials at the imirjazev Agricultural Academy the optimum duraon of treatment of vegetable seeds in water with ultraics at a frequency of 760 Ks/sec. was studied. The ghest yields of radish and eggplant resulted from eatment for 30 to 60 sec., of lettuce and carrot for min., and of onion for 3 min.

97. Guzman, V. L.
Chemical weeding and thinning when using pelletized vegetable seeds.
Weeds, N. York, 1957, **5**: 227-36, illus.

lletized seeds of cabbage, lettuce and capsicum were wn 2·5–4·5 in. apart and treated pre-emergence with ktone, CIPC or CDEC. Two to three weeks after nergence mechanical thinning was compared with emical thinning using the pre-emergence herbicides t 4 lb./ac. in oil applied with a knapsack or a tractor rayer equipped with mechanical or solenoid valves. was found that (1) weed control was more effective ith chemical than with mechanical thinning, (2) the actor unit gave excellent thinning, (3) wind drift aused some temporary weight reduction of the hemically thinned plants, (4) chemical thinning was ore effective when seedings were 3·5 and 4·5 in. part than at closer spacings, (5) chemical thinning ncreased the number of doubles as compared with echanical thinning, but did not affect the yields or uality of the crops.—From *Weed Abstr.*, **6**, No. 1314.

398. Clarkson, V. A., and Frazier, W. A.
Plastic mulches for horticultural crops.
Stat. Bull. Ore. agric. Exp. Stat. **562**, 1957, pp. 12, illus.

Summarized information, based on trials at the Oregon Experiment Station, is given on how to use plastic mulches for vegetable crops and strawberries, and on their advantages and disadvantages compared with other types of mulch.

399. Dodillet, H. J.
Folienhäuser im Gemüsebau—wirtschaftlich? **(The economics of polythene houses for growing vegetables.)**
Gartenwelt, 1957, **57**: 248-9, bibl. 1, illus.

Cropping in a polythene greenhouse was compared with that in the open. Lettuce harvest continued for 12 days longer but yields were considerably lower in the open; beans in the open did not yield; tomato harvesting continued for 50 days longer in the open and final yields only slightly favoured the polythene house. Costs of a polythene house are calculated.

400. Bukovac, M. J., and Wittwer, S. H.
Gibberellin and higher plants. II. Induction of flowering in biennials.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 650-60, bibl. 4.

Several biennials, e.g. carrots, beets, cabbage, kale, collards and swedes, grown at temperatures (10–13° C.) slightly above normal were induced to flower with GB (foliar sprays of 100 to 1,000 p.p.m. or weekly dosages of 100 micrograms of GB to stem apices). [See also *H.A.*, 27: 2034 and 3054.] At a night temperature of 15–18° C. GB induced flowering in carrots but not in the others. In all cases greatly elongated stems occurred. Where flowering was induced flowers and seed set were normal.

401. Wittwer, S. H., and Bukovac, M. J.
Gibberellin and higher plants. III. Induction of flowering in long-day annuals grown under short days.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 661-72, bibl. 12.

Long-day annuals grown under non-inductive, short (9–11 hour) photoperiods showed marked stem elongation and were induced to flower and produce seed by GB. Such crops were leaf and head lettuce, endive, radish, mustard, spinach and dill. GB accelerated flowering in the long-day plants lettuce, endive, radish and mustard kept under 18-hour day conditions. With long-day plants grown under short days a single foliar spray of 100 or 1,000 p.p.m. or 20 to 100 micrograms GB per plant applied at various stages of seedling growth induced flowering in some cases: in others repeated treatment was necessary.

402. Davis, D., and Halmos, S.
The effect of gibberellin on plant disease.
Plant Dis. Reptr, 1957, **41**: 890-1, bibl. 9.

Treatment with potassium gibberellate 5 days before inoculation or at the time or inoculation had no effect, or inconsistent effects, on the susceptibility of tomato plants to early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*) and of Pinto beans to rust (*Uromyces phaseoli* var. *typica*).—Merck, Sharp and Dohme Res. Labs, Rahway, N.J.

403. Johnson, K. E. E., van Eck, W. A., and Shepherd, L. N.
The effect of copper carriers on yield, copper content and quality of several crops grown on organic soils.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 98-112, bibl. 3.

Among crops used as experimental material were spinach and onions. Both copper oxide and copper sulphate were equally effective, soil applications generally being preferable to foliar applications. Copper sulphate, but not copper oxide, applied on contact with onion seed resulted in reduced stand and yield. The equivalent of 3 to 5 lb. copper per acre gave optimum yields.

404. Wenkam, N. S., and Miller, C. D.
Sodium content of Hawaii-grown foods.
Hawaii Fm Sci., 1957, **6**(1): 2-3, illus.

In general the Na content of the fruits and vegetables analysed was comparable to that of mainland grown crops. The Na contents of tomatoes, lettuces and cucumbers were three times higher in samples from near the sea than in those from further inland. Sodium content in papaya increased from 3·9 mg./100 g. inland to 75 mg./100 g. near the sea.

405. Gurlev, A. S., Platonova, E. M., and Priščep, L. G.
Electrical sterilization of soil. [Russian.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 2, pp. 219-29, bibl. 4, illus.

A detailed, illustrated description is given of a bin-type sterilizing unit with a capacity of 0·1 cu.m. of soil, through which electric current passes between 4 metal electrodes. In experiments with cabbage seedlings soil sterilization for 30 min. at 50° C. was inadequate but at 99° C. good control was obtained of club root and canker and growth was improved. Club root infection following soil sterilization at 99° C. in soil adjacent to the electrodes was 11·4% and in that between the electrodes 5·8% compared with 88·9% of the controls. Treatment at 50° C. stimulated canker, whereas that at 99° C. reduced it. In another experiment sterilization of nematode-infested tomato soil prevented gall formation on lettuce and cucumber roots.

406. Ziffer, J., and others.
Phytoactin and phytostreptin, two new antibiotics for plant disease control.
From abstr. in *Phytopathology*, 1957, **47**: 539.

In greenhouse tests low concentrations of both antibiotics have given effective control, without host injury, of tomato early blight, tomato late blight and bean rust.

407. Shell Company of Venezuela.
Recomendaciones para los cultivos de invierno. (**Recommendations for winter crops.**)
Inf. Serv. Shell para Agric., Venezuela, **8**, 1957, pp. 29, illus.

The recommendations, based on experimental results, include: weed control in *Phaseolus* beans with CMU, dinitro compounds and PCP; control of *Cercospora capsici* on paprika with perenox, copper A compound or Dithane Z-78; control of leaf-eating beetles on beans with DDT.

408. Overman, A. J., and Kelsheimer, E. G.
Control of nematodes injurious to vegetable crops.
A.R. Fla agric. Exp. Stats, 1955–56, pp. 260-2.

Pre-sowing treatments with various fumigants all gave good control of nematodes. Pepper transplants from plots treated with allyl alcohol plus EDB produced the best plants in the field. Drenching with soil fumigants was tested under field conditions, and plant response indicated that Vapam and Crag Mylone were the most beneficial to growth of lettuces and beetroot. Both materials significantly reduced soil nematodes and also gave effective weed control [see also *H.A.*, 27: 2399]. At the end of the growing season only plots treated with 150 lb. per acre Vapam injected or with 300 lb. Vapam rototilled had lower nematode counts than control plots. Shallots from a nematode-infested field were transplanted to boxes with parathion or PRD-D10 incorporated in the soil; only parathion at 10 lb. per acre significantly reduced nematode numbers.

409. Ditman, L. P., Owens, H. B., and Harrison, F. P.
Experiments with sprays, dust, and aerosols for the home garden.
J. econ. Ent., 1957, **50**: 324-8, bibl. 2.

Four years' work is reported on the control of pests attacking cabbage, tomato, cucumber, cantaloupe, snap and lima beans and potato grown on mixed plots. Effectiveness of treatment was based primarily on crop yields though phytotoxicity and insect populations were also considered. Of several insecticides studied lindane, Dilan and malathion appeared the most suitable for use in residual aerosols. A combination of malathion with Dilan or lindane is suggested. The effectiveness of malathion in dust, water sprays and aerosols varied with the amount of actual material applied. DDVP showed promise against insects and mites on beans.—Dep. Ent., Univ. Md, College Park.

410. Neiswander, R. B.
Insect control on greenhouse vegetables.
42nd annu. Proc. Ohio Veg. Grs' Ass., 1957, pp. 101-5.

A list of 9 insecticides commonly used on greenhouse vegetables is presented, showing permitted residues and the number of days that should elapse between application and the harvesting of tomato, cucumber and lettuce. Another table lists insects and mites, giving control measures.

411. Showalter, R. K., and Thompson, B. D.
Vacuum cooling and its effects on quality of fresh vegetables.
A.R. Fla agric. Exp. Stats, 1955-56, p. 107.

Bulk containers and prepacks of vegetables were vacuum-cooled and stored at 35°–40° F. with hydro-cooled lots. Only radish tops showed marked signs of wilting during vacuum cooling. Both types of package gave satisfactory results in storage [see also *H.A.*, 27: 2398]. Two cantaloupe varieties harvested at 2 stages of maturity were precooled to 30°, 40° or 50° F. and stored at 40° and 55° F. There were indications of fruit damage on Hale's Jumbo variety precooled to 30° and stored at 55° F. Fruit rot developed in the Rio-Gold variety under all conditions of storage.

Artichokes (globe).

See 535o.

Asparagus.

(*See also* 535n.)

12. WELLENSIEK, S. J., AND JONKERS, H.
Effect van selectie can zeer jonge asperge-planten. **(The effect of selection of very young asparagus plants.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 506-11, bibl. 6.

oung asparagus plants were selected for male flower- g and/or vigour by methods described in an earlier aper [see *H.A.*, 20: 821]. Selection for male flowering sulted in increased yields of 35·2% in weight and of ·6% in stem number. Selection for vigorous owth also resulted in yield increases in weight and em number, but differences were not significant. negative interaction was found between the effects selection for male flowering with and that without lection for vigour. It is concluded that selection for ale flowers during the first year of growth may be commended.—Lab. Tuinbouwpl., Wageningen.

Brassicas.

(*See also* 390, 397, 400, 405, 409, 534f, y, 990.)

13. VITTUM, M. T., AND PECK, N. H.
Response of cabbage to irrigation, fertility level and spacing.
Bull. N.Y. agric. Exp. Stat. 777, 1956, pp. 34.

igation increased the average weight per head and refore the marketable yield and gross yield of isconsin All-Season cabbage. Extra fertilizer almost bled the percentage of burst heads so that the actual crease in marketable yield was very slight. Close acing of plants in the row reduced the percentage of rst heads and greatly reduced the average weight r head, but very significantly increased the market- le yield and also the gross yield of cabbage. Maxi- um yields were obtained from closely spaced cabbage soil heavily fertilized and irrigated as needed.

14. FRÖHLICH, H.
Darf Kohl nach Kohl gepflanzt werden? **(Should cabbage be planted after cabbage?)**
Dtsch. Gartenb., 1957, **4**: 212-14, bibl. 6.

a series of trials the effect of cabbage crops on soils nd in rotation has been observed. Soil structure and content were hardly affected by a cabbage crop, but inach yields were reduced after cabbage in com- arison with other vegetable crops. Early white abbage grown after other brassicas showed reduced ield and quality, when compared with yields after arrots or fallow. This effect was more marked on ght soils than on heavier soils.—Inst. Gartenb., rossbeeren.

415. SALTER, P. J.
Blindness in early summer cauliflower.
Nature, 1957, **180**: 1056, bibl. 4.

vidence was obtained to support the suggestion that lindness in cauliflowers could be caused by low tem- eratures when the seedlings were at a certain stage of development [see *H.A.*, 27: 2407]. Seedlings of variety Finneys 110, not normally susceptible to blindness, were found to be particularly sensitive to a period of low temperature (33±2° F.) at a stage when approximately 7 leaves had been initiated. Low temperature treatment before or after that stage caused blindness to a lesser extent.—Nat. veg. Res. Stat., Wellesbourne, Warwick.

416. WALKER, J. C., AND EDGINGTON, L. V.
Studies of internal tipburn of cabbage.
Abstr. in *Phytopathology*, 1957, **47**: 537.

Internal tipburn of cabbage is a necrotic breakdown beginning in the marginal tissue of leaves located near the centre of the head. The disease appears as the plants are approaching maturity. It is most severe in plants located in poorly drained portions of fields. No disease occurred in plants grown to head stage in sand watered with balanced Hoagland solution containing 200 p.p.m. Ca. The disease was severe in comparable plants supplied with the same solution except that the Ca content was 25 p.p.m. Analysis of cabbage heads showed that the percentage of Ca in the marginal tissue of internal head leaves was about one-third the average for the total head tissue. This difference was observed in diseased and in healthy heads. It is suggested that the breakdown in the low-Ca tissue is associated with environmental factors that upset the normal flow of slow-moving Ca ions into the marginal leaf tissue.

417. JENKINSON, J. G., AND CAMPBELL, W.
Scorch of winter cauliflower.
Plant Path., 1957, **6**: 92-4, illus.

In varietal trials with broccoli there were indications that susceptibility to scorch was an inherited characteristic, and this was confirmed in breeding experiments. Symptoms of scorch in the field were aggravated by high levels of inorganic N. It is suggested that the disorder may be caused by a minor element deficiency. —Seale-Hayne agric. Coll., Newton Abbot, and N.A.A.S., Exeter.

418. CAMPBELL, L.
Control of clubroot of cauliflower.
From abstr. in *Phytopathology*, 1957, **47**: 518.

When zineb or Terrachlor were applied to cauliflower in the transplanting water at the rate of 2·25 lb. active ingredient per 100 gal., clubroot development was reduced by 90·3% and 91·1% respectively and yield was increased by 360% and 257% respectively. When Terrachlor was applied on the soil surface in strips, best results were obtained from using 35 lb. per acre with the strips 8 in. wide and rototilled to a depth of 4 in.; this reduced clubroot development by 83·6% and increased yield by 378·3%. This treatment also gave excellent control of annual weeds.

419. NATTI, J. J.
Control of downy mildew of broccoli with antibiotics and fungicides.
Plant Dis. Reptr, 1957, **41**: 780-8, bibl. 2.

Nine fungicides and 28 antibiotics were used in spore germination tests on *Peronospora parasitica* and in greenhouse and field control tests. In field tests Agri-Strep at 3 lb. per acre provided outstanding control for up to 27 days after the final spray application but it caused severe bleaching of the foliage. At 0·6 lb. per acre Agri-Strep was more effective than Manzate at 4 lb. per acre or Spergon SL at 3 lb. per acre, but caused moderate bleaching of the foliage. Copper-zinc and copper-manganese were the most effective of the fungicides tested but caused a trace of injury. On the basis of control and freedom from phytotoxicity, Manzate and Spergon SL were the most promising of the fungicides. Thioneb also showed some promise. Captan 50W, Kemate and Vancide M were ineffective. [See also *H.A.*, 27: 3443.]—N.Y. St. agric. Exp. Stat., Geneva.

420. LIGHT, W. I. ST. G., AND MORETON, B. D.
The control of cabbage root fly in seedbeds.
Plant Path., 1957, **6**: 109.

Cabbage root fly was most successfully controlled in a cauliflower seedbed by broadcasting aldrin or dieldrin at 2·8 lb. per acre, or by drilling aldrin at 0·5 oz. per 10 yd. row. Row application was more economical.—N.A.A.S., Wye.

Celery.

(*See also* 167, 534y.)

421. ENO, C. F., WESTGATE, P. J., AND BLUE, W. G.
Soil microbiological trends and their relation to the growth of celery and the nutrient status of the soil.
Proc. Soil Crop Sci. Soc. Fla 1956, 1957, **16**: 165-75, bibl. 10.

Celery growing in fine sandy soil was supplied with 5–5–8 fertilizer between the rows 2 weeks after transplanting and in 9 subsequent instalments, totalling 0, 1, 2, 3, 4 or 5 tons per acre. Results of the 2 highest applications were: (1) yield reduction, (2) reduced activity of soil micro-organisms, (3) a marked fall in soil nitrifying potential. Even at 3 tons per acre 47% of the crop was affected by blackheart.

422. JOHNSON, K. E. E., DAVIS, J. F., AND BENNE, E. J.
Control of magnesium deficiency in Utah 10B celery grown on organic soil.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 528-32, bibl. 8.

Two to four tons of hydrated magnesium sulphate broadcast and worked into the soil were required to control symptoms of Mg deficiency in this celery variety. Equally effective control could be obtained by applying 10 lb. of magnesium sulphate per acre in 100 to 150 gal. water as a foliar spray at 10-day intervals, beginning 4 weeks after transplanting and continuing throughout the remainder of the growing season. No Mg carriers used produced any increase in yields of celery, but use of them generally improved quality and increased the value of the crops. K fertilizers individually and jointly with Na fertilizers tended to increase the incidence of Mg deficiency symptoms. These symptoms were reduced to a minimum when the exchangeable Ca : Mg ratio in the soil was less than 3 : 1 and when the Mg saturation of the exchange complex was greater than 22%. [From authors' abstract.]—Mich. St. Univ., E. Lansing.

423. COX, R. S.
Anthracnose, an undescribed disease of celery in the Everglades.
Plant Dis. Reptr, 1957, **41**: 790-3, bibl. 4, illus.

A new anthracnose disease observed in celery seedbeds is considered to be possibly due to a species of *Colletotrichum* [see also *H.A.*, 27: 2410]. Tribasic copper sulphate or a combination of Parzate and Thylate gave excellent control.—Everglades Exp. Stat., Univ. Fla, Belle Glade.

Cucurbits.

(*See also* 392, 404, 405, 409, 411, 534j, r-t, y, 535c, f, h, i.)

424. ITO, H., AND SAITÔ, T.
Factors responsible for the sex expression of Japanese cucumber. VI. Effects of artificially controlling daylength and night temperature during the various stages of seedling development in the nursery bed.
[Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1957, **26**: 1-8, bibl. 1, illus.

Short days and low night temperatures favour pistillate flower formation and long days and high night temperatures staminate flower formation in the cucumber plant. Experiments showed that these environmental factors affected sex expression by changing the physiological condition of the plant before flower differentiation. Temperature and daylength should be carefully controlled when the seedlings are between 10 and 30 days old, since later treatment failed to counteract adverse conditions experienced at this early stage. [For part V see *H.A.*, 27: 3461.] J.R.L.

425. DE STIGTER, H. C. M.
Studies on the nature of the incompatibility in a cucurbitaceous graft. [Dutch summary 2 pp.]
Meded. LandbHoogesch. Wageningen, 1956, **56**(8): 1-51, bibl. 48, illus.

Physiological and anatomical aspects of graft incompatibility between muskmelon scions and *Cucurbita ficifolia* stocks were studied. So long as leaves were allowed to remain on the stock the graft was compatible, but scion growth, dry matter production and starch accumulation were related to leaf number per stock. With defoliation of *C. ficifolia* stock there was a rapid collapse of sieve-tubes in the stock, before any symptoms appeared in the scion. The action of the stock leaves was dependent on light intensity, although some effect was observed even in darkness. The double-graft combination of melon on *C. ficifolia*, as a leafless interstock, on cucumber rootstock was compatible only when leaves were left on the stock; a similar effect was obtained with the same scions and interstock on melon stock, but in this case growth was very slow. The combination of cucumber (scion) on melon (interstock) on *C. ficifolia* (stock) was completely incompatible, except when the interstock was 1½ in. long. When the direction of the normal cuts for approach grafting was reversed, growth was depressed but incompatibility was reduced. Plants of melon on *ficifolia* showing advanced incompatibility recovered when contact with stock leaves was renewed. Virus not considered to be the cause of melon/*ficifolia* incompatibility. The author concludes that the presence of stock leaves is required to provide the stock with some specific substance enabling the phloem in the stock to behave normally. The specific substance is presumed to be of an enzymatic or hormonal nature. The growth-regulating activity of the stock leaves appears to be connected with the interactions between the melon scion and the cucurbit stock. The author finally discusses incompatibility in general.—ab. Tuinbouwpl. Wageningen.

426. Singh, G. P., and Pound, G. S.
Nitrogen nutrition of squash and the multiplication of squash mosaic virus.
From abstr. in *Phytopathology*, 1957, **47**: 534.

Squash plants were grown at N concentrations of 21, 210, 630, and 1,050 p.p.m., with nitrate as the sole source of N except at 1,050 p.p.m. where it was supplied as both nitrate and ammonium N. Host growth was depressed at 630 p.p.m. in comparison with 210 and 1,050 p.p.m. Virus concentration generally increased with increase in N up to 630 p.p.m. Virus concentration did not reflect the depression in host growth at 630 p.p.m. In other experiments in which both nitrate and ammonium N were used to obtain levels of 630 and 1,050 p.p.m. growth consistently increased with increase in N up to 630 p.p.m.; at 1,050 p.p.m. marked stunting occurred. Virus concentration generally followed the growth curve. No correlation between acidity of sap extracts and virus concentration was evident, but the pH of sap from infected plants at all levels of N was slightly lower than that of sap from non-inoculated plants. The depressed growth at 630 p.p.m., with all N supplied by nitrate, is believed be due to toxicity of sodium ions, which were in greater proportion in solutions at this level than in those containing 1,050 p.p.m.

427. Teakle, D. S.
Fusarium foot rot of cucurbits.
Qd agric. J., 1957, **83**: 253-5, illus.

Superficial infection of cucurbit seed with *Fusarium solani* f. *cucurbitae* can be controlled by soaking the seed in 1 : 1,000 mercuric chloride solution for 15 minutes. When the fungus has penetrated the seed hot water treatment at 55° C. for 15 minutes is required. J.R.L.

428. Takahashi, M., and Itoi, S.
Studies on the mechanism of resistance in the damping-off of cucurbit seedlings. 3. The changes in oxidase activity, polyphenols and ascorbic acid in the seedling tissues of pumpkin inoculated with *Pythium ultimum*.
[Japanese, with English summary 8 lines.]
Bull. Univ. Osaka Pref., Ser. B, 1956, **6**: 123-5, bibl. 15.

It was found that the activity of oxidase and peroxidase was greater and that polyphenols accumulated more in the affected parts of inoculated seedlings than in healthy tissues. Two days after inoculation the diseased seedlings contained more ascorbic acid and oxidized ascorbic acid than the controls. J.R.L.

429. Mercado, O., and Abastos, M.
Comparativo de insecticidas en el cultivo de las cucurbitáceas (sandía). 1956-57.
(Comparison of insecticides applied to cucurbits (water-melon), 1956-57.)
Inf. mens. Estac. exp. agríc. La Molina, 1957, **31**(356): 13-16, bibl. 2.

For control of *Diaphania* and cecidomyid larvae the most effective treatment was spraying with 0·05% Folidol and the least effective was that with 0·1% Basudin. With 0·05% DDT, 0·05% Rothane or 0·04% Dieldrex control was moderate.

Legumes.

(*See also* 13, 15, 23, 28, 35, 49, 51, 390-392, 402, 406, 407, 506, 534e, y, 535f, l, m, q, t, u, 1005.)

430. Dowdles, D.
Pea varieties in southern coastal Queensland.
Qd agric. J., 1957, **83**: 248-52, illus.

Trials have shown that all 6 varieties tested produce earlier crops with about double the yield if sown in the autumn rather than the spring. Canner 75 and Shasta yielded particularly well. J.R.L.

431. Hubbeling, N.
New aspects of breeding for disease resistance in beans (*Phaseolus vulgaris* L.) [Dutch summary 1½ pp.]
Euphytica, 1957, **6**: 111-41, bibl. 36, illus.

The three aspects discussed are disease symptoms as the main basis for testing for resistance, cultivated varieties and wild species as sources of resistance, and the difficulties and possibilities in selecting for resistance against several diseases.

432. Shewfelt, A. L., and Mohr, W. P.
Bean size as an indication of canning quality.
Abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 13.

Seed and pod measurements were taken on snap beans of three yellow and three green varieties grown in 1955. A substantial range in seed size was noted in pods of equal diameter. With No. 3 pods seed lengths varied from 5 to 10 mm. and seed widths from 3 to 6 mm. With No. 4 pods the corresponding ranges were 6 to 11 mm. and 4 to 7 mm.; and with No. 5 pods 8 to 14 mm. and 5 to 8 mm. Ratios of seed length to seed width and of pod width to seed width showed more promise as indications of canning quality and of varietal characteristics than seed and pod dimensions alone. A difference between certain varieties in the ratio of seed length to seed width was indicated. The ratio of pod width to seed width was influenced by variety, pod size, and interval between harvests. The latter ratio was more closely associated with canning quality than the seed length to seed width ratio. Results indicated that the pod width to seed width ratio at canning maturity should not average less than 1·60. On the basis of the above measurements, together with subjective panel ratings, the variety Rival showed characteristically good canning quality while Contender was rather poor.

433. Turner, D. H., and Turner, J. F.
Physiology of pea fruits. III. Changes in starch and starch phosphorylase in the developing seed.
Aust. J. biol. Sci., 1957, **10**: 302-9, bibl. 26.

During the growth of pea seeds there is a period in which the starch content rises rapidly and the sucrose content falls. Over most of the period of development a linear relationship existed between the rate of starch synthesis and starch phosphorylase activity. The activity of starch phosphorylase may be a major factor in controlling rate of starch formation in the pea. The rate of starch synthesis began to decrease when the pea ceased to gain water and the linear relationship then no longer held.

434. Viglierchio, D. R., and Went, F. W.
Plant growth under controlled conditions. IX. Growth and fruiting of the Kentucky Wonder bean (*Phaseolus vulgaris).*
Amer. J. Bot., 1957, **44**: 449-53, bibl. 11, illus.

A Kentucky Wonder variety of *Phaseolus vulgaris* was grown under controlled environmental conditions. The finding for tomato, chili pepper and tobacco [see *H.A.*, 14: 1763, 16: 335, 925, 2114, 18: 444, 21: 2748 and 23: 1986] that night temperature is the most critical factor influencing developmental processes was observed to apply to beans as well. The variety of bean used was found to be day neutral, though a long photoperiod greatly improved both growth and fruit production. Fruit production peaks were observed. [Authors' summary.]—Univ. Calif., Davis.

435. Bártfay, T.
Foszforvegyületek alakulása a borsónövény fejlődése folyamán. **(Changes in the phosphorus compounds of peas during development.)** [English and Russian summaries ¾ p. each.]
Növénytermelés, 1956, **5**: 321-30, bibl. 20.

The acid-soluble, lipid, nucleic acid and protein fractions of the phosphorus content were examined at regular intervals in all organs of pea plants grown in sand culture. At all stages of growth the acid-soluble fraction predominated. The nucleic acid fraction was high in young tissue, but it declined with age as did the proteid phosphorus. In other experiments the nutrient solution, which contained P^{32}, was found to supply 35% of the plants' P at the 10th day from germination and 72% at the 20th day, the rest of their P supply coming from the seed.—Inst. agrochem. Res., Hung. Acad. Sci., Budapest.

436. Pilet, P.-E.
Action de l'acide β-indolyl-acétique, à diverses températures, sur la croissance des racines et la formation des radicelles du *Lens*. **(Effect of indoleacetic acid at various temperatures on root growth and lateral root formation in *Lens*.)** [English summary ⅓ p.]
Phyton, 1957, **8**: 13-20, bibl. 33.

Elongation of lentil roots increased with increase in temperature from 5° to 19° C., but above 24° C. elongation decreased. The growth of root tips was increased by treatment with IAA when they were 3 or 30 mm. long, the stimulation being inversely related to IAA concentration. This stimulation was decreased, or even turned to inhibition, with a rise in temperature. These observations are discussed in relation to the amount and distribution of auxin in the roots. Lateral root formation was found to be directly related to temperature and IAA concentration within the range of conditions used.—Univ. Lausanne.

437. Wittwer, S. H., and Bukovac, M. J.
Gibberellin and higher plants. VIII. Seed treatments for beans, peas and sweet corn.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 215-24, bibl. 7.

GB at 500 to 1,000 p.p.m. in a slurry seed protectant applied to seeds hastened emergence and healthy early growth in peas and beans. At 2,500 p.p.m. or more there was abnormality and excessive stem elongation.

438. Vlitos, A. J., and Meudt, W.
The effect of light and of the shoot apex on the action of gibberellic acid.
Contr. Boyce Thompson Inst., 1957, **19**: 55-62, bibl. 9.

GA overcame the inhibiting effects of red, blue or green light on the elongation of stems of Alaska pea seedlings. The second internode of intact, treated seedlings produced a greater total elongation than comparable decapitated seedlings. The results, which are discussed, suggest that the elongation response is dependent not only on GA but also on the combined activity of growth factors produced in the shoot apex. [See also *H.A.*, 27: 3053.]

439. Taper, C. D., and Leach, W.
Studies in plant mineral nutrition. III. The effects of calcium concentration in culture solutions upon the absorption of iron and manganese by dwarf kidney bean.
Canad. J. Bot., 1957, **35**: 773-7, bibl. 5.

Irrespective of Ca concentration, leaf Mn was reduced by increasing the Fe/Mn ratio of the solution and leaf Fe was reduced by increasing the Mn/Fe ratio. When the Ca was increased from 42 to 143 p.p.m. in the solution, accumulation of both Fe and Mn in the leaves decreased. At the lower Ca level the optimal Fe/Mn ratio range in the solution was 0·5–5·0, but at the higher level it was narrowed to 2·0. Values above the optima resulted in Mn deficiency and those below in Fe deficiency. [For part II see *H.A.*, 25: 576.]

440. Wallace, A., and others.
Some aspects of the use of metal chelates as micronutrient fertilizer sources.
Soil Sci., 1957, **84**: 27-41, bibl. 26.

The Mn content of bush beans growing in nutrient solutions was reduced by increasing the Fe level and by adding EDDHA (ethylenediamine di(o-hydroxyphenyl acetic acid)) or HEEDTA (hydroxyethylethylenediaminetriacetic acid). The top/root ratio was increased very markedly by HEEDTA but not by EDDHA, whereas in a previous study it was increased by EDDHA and not by HEEDTA. Spraying Fe-deficient bush beans with radioactive FeEDTA showed that its absorption by leaves, petioles and whole plants differed considerably and that the Fe and EDTA components were not equally absorbed by the different organs, deviations occurring in both directions from the ratio in which the two components were applied. The advantages of sprays over soil applications are discussed.—Univ. Calif., Los Angeles.

441. Brown, R., and Possingham, J. V.
Iron deficiency and the growth of pea roots.
Proc. roy. Soc., Ser. B, 1957, **147**: 145-66, bibl. 16.

Vhen pea roots were cultured in an iron-deficient erile medium, increases in length and number of cells irtually ceased after 7 days; thereafter the increase in espiration was relatively small. Protein, however, ontinued to increase throughout the whole culture eriod of 11 days. When roots in which growth had eased were transferred to a complete nutrient medium rowth was resumed. This indicates that the roots ere not moribund and that the abrupt cessation of ell division was the result of a disturbance confined the meristem. The possible mechanism involved is iscussed.—A.R.C. Unit Plant Cell Physiol., Dep. gric., Oxford.

442. Medvedev, Ž. A.
The distribution of labelled S compounds of bean seeds in the proteins and organs of plants grown from them. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 379-82, bibl. 6, illus.

he seeds of bean plants grown in sand culture with were found to show 82·5% of the radioactivity of he nutrient solution. Plants grown from these seeds sand culture under 12-hour day artificial light etained most of the radioactivity in their roots, rimary leaves and stems in the early stages; later it as mainly found in the inflorescence and seeds.

443. Thaung, M. M., and Walker, J. C.
Studies on bacterial blight of lima bean.
Phytopathology, 1957, **47**: 413-17, bibl. 14, illus.

isease [*Pseudomonas syringae*] development was arkedly enhanced in plants grown in high-N, low-P, d low-K nutrients, when compared with those grown a balanced solution. [From author's summary.]—niv. Wis., Madison.

444. Woolliams, G. E.
Bean halo blight control with streptomycin sulphate.
Abstr. in *Phytopathology*, 1957, **47**: 538.

ield-sown bean plants grown in 1955 from seed ifected with the halo blight pathogen (*Pseudomonas haseolicola*) received 3 weekly spray applications of treptomycin sulphate (500 p.p.m.). The first spray as applied after the first pair of trifoliate leaves had eveloped and after halo blight symptoms had appeared n the foliage. Diseased plants were rogued from all lots just before the second spray application. By the ime the seed crop was harvested in the autumn, halo light had reappeared on at least 25% of the unsprayed heck plants but on none of the sprayed plants. In eplicated plots planted in 1956 with the seed, 36% of he plants grown from seed that had been collected from he unsprayed check plots had halo blight, whereas 7% f those grown from seed that had been collected from he sprayed plots had the disease. In a replicated seed-reatment experiment diseased bean seed was soaked or 30 minutes, just prior to field planting, in streptonycin sulphate solutions at concentrations of 50, 100, 50 and 500 p.p.m. Average halo blight incidence was 6, 49, 36 and 38% respectively among the plants grown from treated seed; 72% of the plants grown from untreated seed were infected.

445. Johnson, J. C.
Pod twist: a previously unrecorded bacterial disease of french bean *(Phaseolus vulgaris* L.).
Qd J. agric. Sci., 1956, **13**: 127-58, bibl. 11, illus.

A disease which causes blighting and twisting of the pods of french bean is described. In the field transmission is effected by the bean thrips (*Taeniothrips nigricornis*) and by no other apparent means. Study of the causal organism shows it to be a new species of *Pseudomonas*. [From author's summary.]—Div. Plant Indus., C.S.I.R.O.

446. Anderson, A. L.
Use of antibiotics and other chemicals for control of common and fuscous blights of beans.
From abstr. in *Phytopathology*, 1957, **47**: 515.

Among several derivatives of 2-pyridinethiol, 1 oxide, only the copper salt at 500 p.p.m. gave control of *Xanthomonas phaseoli* and *X. p.* var. *fuscans* on navy pea beans. Compounds containing streptomycin sulphate were even more effective in preventing infection. When combined with 200 p.p.m. of streptomycin sulphate, the copper salt of pyridinethiol stimulated plant growth, improved the colour and increased the yield.

447. Napier, E. J., and others.
Systemic action of captan against *Botrytis fabae* (chocolate spot of broad bean).
J. Sci. Food Agric., 1957, **8**: 467-74, bibl. 9.

The control of *Botrytis fabae* effected by foliage and root applications of captan was examined. Captan applied to the dorsal surfaces only of leaves protected the ventral surfaces of the same leaves and also leaves both above and below the foliage to which it had been applied. These systemic antifungal effects showed marked persistence. When watered on to the roots, captan gave indications of a similar systemic protection of the foliage against the same pathogen. A nomogram is provided to facilitate calculation of fiducial limits from a population of different variance. [From authors' abstract.]—Glaxo Labs, Sefton Park, Stoke Poges, Bucks.

448. Revilla, V., and Vargas S., R.
Control del oidium y la roya del fríjol, 1956. **(Control of mildew and rust in beans, 1956.)**
Inf. mens. Estac. exp. agric. La Molina, 1957, **31**(358): 9-12.

The attack of mildew (*Erysiphe polygoni*) was too slight to differentiate between treatments. Rust (*Uromyces phaseoli*) was well controlled by 6 applications of lime-sulphur dust or of 1% Karathane dust.

449. Bremer, H.
Zur Behandlung von Bohnensaatgut mit kombinierten Beizmitteln. **(The treatment of bean seed with combined chemicals.)**
Reprinted from *Anz. Schädlingsk.*, 1957, **30**: 84-5, bibl. 4.

Insecticide-fungicide mixtures were applied to beans at the rate of 10 g./kg. The most successful mixtures were captan or COBH with dieldrin. The mercury-lindane mixture was the least effective.—Inst. Gemüseb. u.Unkrautforsch., Neuss-Lauvenburg.

450. Unterstenhöfer, G.
Die Bekämpfung von Pflanzenschädlingen durch Saatgutbehandlung mit systemischen Insektiziden. (**The control of pests by seed treatment with systemic insecticides.**)
[English summary 7 lines.]
Z. PflKrankh., 1957, **64**: 619-25, bibl. 12.

The thiono-thiol-phosphates proved to be the most suitable compounds for seed treatment, and of these Thimet and Disyston were the most promising when applied as 50% activated charcoal formulations. Successful control was obtained of aphids and bean weevil (*Sitona lineatus*) on broad beans and of *Tetranychus telarius* on french beans.

451. Sherman, M., and Tamashiro, M.
Control of insect and mite pests of beans in Hawaii.
J. econ. Ent., 1957, **50**: 236-7, bibl. 1.

Against greenhouse whitefly, *Trialeurodes vaporariorum*, EPN w.p. at 0·063% was the most effective insecticide, followed by Strobane at 0·13% and isodrin at 0·03%. Good control of two-spotted spider mite, *Tetranychus telarius*, was obtained with EPN w.p. at 0·063% and endrin and isodrin each at 0·03%. Southern garden leafhopper, *Empoasca solana*, and onion thrips, *Thrips tabaci*, were controlled by all the materials tested, i.e. EPN, heptachlor, Strobane, endrin and isodrin. Against broad mite, *Hemitarsonemus latus*, sulphur was superior to the other materials, although ovex at 0·03%, malathion at 0·25% and demeton 0·125% were also satisfactory.—Hawaii agric. Exp. Stat., Honolulu.

452. Shewfelt, A. L., and Mohr, W. P.
Effect of harvesting frequency on the yield and canning quality of yellow snap beans.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 12.

Three varieties of yellow snap beans were harvested at 3-, 5-, 8- and 12-day intervals. Yields did not appear to be affected by harvesting frequency. Comparing the 3-day with the 12-day interval, the percentage by weight of No. 5 pods and over increased from 16·3 to 41·9, the number of pods per 100 g. decreased from 25·5 to 18·9, the percentage of seeds in the canned product (mixed sizes) increased from 6·0 to 13·5, and the alcohol insoluble solids increased from 4·28 to 5·28%. Neither colour nor flavour of the canned beans (size No. 4) was affected by harvesting frequency. Texture rating decreased from very good for the 3-day interval to fair to good for the 12-day interval. It is considered that, for the area studied, 3 harvestings at 5- to 8-day intervals would be adequate.—Exp. Fm, Morden, Man.

Mushrooms and other fungi.

(*See also* 535s.)

453. Lambert, E. B., and Ayers, T. T.
Copper sulphate ineffective as a control for yellow moulds in mushroom beds.
Bull. Mushroom Grs Ass., 1957, No. 92, pp. 269-70, bibl. 5.

Experiments showed that copper sulphate solutions watered onto the surface of the compost before filling or after spawning, or mixed with the soil before casing, did not appreciably affect the yield of mushrooms or the development of yellow moulds.—Agric. Res. Serv., U.S.D.A. J.R.L.

454. Gilbert, F. A., and Robinson, R. F.
Food from fungi.
Econ. Bot., 1957, **11**: 126-45, bibl. 60.

An interesting article on future possibilities, aspects discussed ranging from the food value of mushrooms to the production of fungal mycelium as food and the acceptance and economics of fungal food.

Okra.

455. Démétriadès, S. D.
Sur le métabolisme anormal observé chez l'*Hibiscus esculentus* L. dans le cas de carence de fer. (**Abnormal metabolism observed in *Hibiscus esculentus* due to iron deficiency.**)
Ann. Inst. phytopath. Benaki, 1955, **9**: 10-29, bibl. 57, illus.

Seedlings of okra grown in culture solutions lacking Fe differed from those supplied with Fe in containing more soluble N, total sugar and growth-inhibiting substance and less protein. Their catalase activity was in some instances increased and in others unchanged.

456. Démétriadès, S. D.
Sur l'accumulation d'asparagine chez l'*Hibiscus esculentus* L. privé de fer. (**Accumulation of asparagine in *Hibiscus esculentus* deficient in iron.**)
Ann. Inst. phytopath. Benaki, 1956, **10**: 13-21, bibl. 8.

Changes in asparagine content were closely similar to those in reducing-sugar content of okra seedlings grown in culture solutions with and without Fe. In the latter solution the disappearance of both substances was markedly slower than in the complete solution. In all instances the disappearance was preceded by a sharp rise.

Onions and allied crops.

(*See also* 68b, 396, 408, 534c, d, k, n-p, v, y.)

457. Koncevoj, M. G.
Biological characteristics of the Mjačkovski onion and some problems connected with its selection. [Russian.]
Izv. Timiryazev. seljsk. Akad., 1957, No. 1, pp. 20-30, bibl. 14.

A description is given of the physical and chemical properties of this large, productive onion, with emphasis on those qualities desirable for varietal improvement.

458. Corrales Macedo, A.
Producción de semilla botánica de cebolla en el valle del Rimac. (**Production of onion seed in the Rimac valley [Peru].**)
Inf. mens. Estac. exp. agríc. La Molina, 1957, **31**(356): 5-12, illus.

Onion seed, normally produced in Peru only in the

Arequipa district, was successfully grown near the coast from selected Arequipa bulbs. These were kept in cold storage for 100 or 120 days and planted in April and May respectively. The yield of seed was rather low, but in addition to this the same initial planting produced a very satisfactory crop of bulbs. The later planting gave the higher yield of each. This purely exploratory experiment will be repeated under improved conditions.

459. KRICKL, M.
Steckzwiebelanzucht. **(The raising of onion sets.)** [English, French and Spanish summaries 11–15 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 254-71, bibl. 4.

The following results and recommendations are reported from several years' trials at the experiment stations of Wien-Prater and later of Neusiedl am See: (1) Onion seed for the raising of sets should be sown at a date likely to result in emergence about May 15. (2) A distance between rows of 15 cm. yielded the largest amount of bulbs of the desired size (up to 2·5 cm.); with wider spacing the bulbs grew too large. (3) Larger bulbs produced higher yields than small bulbs, but the former were more liable to bolt. (4) If the tendency to bolt has not been eliminated by breeding, the bulbs should be stored at ±15° C.; large bulbs (over 2·5 cm.) were found to benefit from four weeks' after-treatment at 15° C. Small bulbs were especially affected by loss of weight during storage.

460. TATEBE, T.
On the vegetative reproduction of onions by the headset method. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 126-8, bibl. 3.

Stem bulblet formation in normal and male-sterile onions was induced by cutting off the inflorescences at the base of the pedicel. A second clipping was necessary to remove developing flower buds.

461. HANAOKA, T., AND ITO, K.
Studies on the keeping quality of onions. (1) Relation between the characters of bulbs and their sprouting during storage. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 129-36, bibl. 14, illus.

In the onion variety Sapporo-ki the sprouting percentages in storage were lowest in round bulbs and in those with firm flesh and necks. Soluble solids were highly significantly related to dry matter content, and increased from the top to the base of the bulb. There was a significant negative correlation between soluble solids content and the amount of sprouting in storage.

462. JONES, S. T., AND KEHR, A. E.
The cytology and plant characteristics of an amphidiploid derived from *Allium ascalonicum* × *A. fistulosum*.
Amer. J. Bot., 1957, **44**: 523-9, bibl. 11, illus.

The colchicine-induced amphidiploid showed greater vegetative vigour than either parent or the F_1 hybrid, and was highly resistant to pink root disease (*Pyrenochaeta terrestris*). In growth habit it resembled the *fistulosum* parent.

463. LEACH, L. D., AND SEYMAN, W. S.
Localized fungicide placement for control of garlic white rot.
From abstr. in *Phytopathology*, 1957, **47**: 527.

In December, 1953, several fungicides as wettable powders or solutions were sprayed into the furrow containing machine-planted garlic cloves by means of 2 nozzles arranged to distribute the fungicide as uniformly as possible from the bottom of the furrow to the surface of the soil. With a planting depth of 2 in. and furrow width of 2 in., 10 lb. of actual fungicide per acre furnished an average concentration of approximately 160 p.p.m. (dry-soil weight basis). Captan at 6 or 12 lb./acre was ineffective for control of *Sclerotium cepivorum*. Calomel ($HgCl$) at 12 lb. gave fair protection, whereas $HgCl_2$ at 12 lb. or PCNB (pentachloronitrobenzene) at 25 lb./acre provided good protection. Similar trials in 1955 showed that PCNB sprayed as wettable powder or as emulsifiable concentrate at 15–25 lb./acre (240–400 p.p.m.) or $HgCl_2$ at 10 lb. gave much better control than did calomel. Dusting the PCNB into the furrow gave protection comparable to spraying. Clove treatment with PCNB at 1% of clove weight reduced clove but not neck infection.

Rhubarb.

464. MURAKISHI, H. H., POTTER, H. S., AND RUSHMORE, W. L.
The cause and control of post harvest leaf breakdown of hothouse rhubarb.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 147-53, bibl. 4.

The organism causing the rot was found to be a *Botrytis* species. After laboratory trials in which 5 other fungicides significantly reduced leaf rot, manzate gave significantly better control than the rest in a stripping trial. The destruction of cull piles was found desirable. Other post-harvest treatment proved ineffective.

Root crops.

(*See also* 43, 390, 396, 400, 408, 534w, y, 535e, k.)

465. SONDHEIMER, E.
The isolation and identification of 3-methyl-6-methoxy-8-hydroxy-3,4-dihydroisocoumarin from carrots.
J. Amer. chem. Soc., 1957, **79**: 5036-9, bibl. 16.

Extraction of bitter-flavoured carrots with hexane yielded a substance which has been identified as 3-methyl-6-methoxy-8-hydroxy-3,4-dihydroisocoumarin. It is believed that this is one of several compounds responsible for bitter off-flavours that are often acquired by carrots held in cold storage.—N.Y. St. agric. Exp. Stat., Cornell Univ.

466. KUNZ, E., AND SLADOVNÍK, K.
Možnost použití plynárenské čpavkové vody k hnojení zemědělských plodin. **(Possibilities of utilizing ammonia waste waters from gas works for fertilizing agricultural crops.)** [English, Russian and German summaries 1 p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 353-74, bibl. 12, illus.

The composition, characteristics and availability of ammonia waste water and methods and economics of its application are discussed. Yields obtained with ammonia water containing 1% N were similar to those obtained with an equal dose of ammonium sulphate and the cost was lower. A chart is given showing when waste water can effectively be used on crop plants, including carrots, poppies and green vegetables [unspecified]. Ammonia water applied to carrots on March 3, 1954, at 150 hl. (150 kg. N) per ha. increased root yields by 62 centners above those of the controls and also improved quality.

467. Sisakjan, N. M., and Kobjakova, A. M.
Lipoxidase of isolated plastids. [Russian, with English summary 12 lines.]
Biohimija, 1957, **22**: 516-22, bibl. 16.

A study was made of the lipoxidase activity of isolated plastids, i.e. chloroplasts and leucoplasts of sugar beet leaves and chromoplasts of carrot roots. It was found that on resumption of growth in store carrots with a poor storage quality showed a large increase in chromoplast lipoxidase activity, whereas roots with a good storage quality showed an insignificant change. It is suggested that lipoxidase activity is associated with the resistance of carrots to storage rots.

468. Algérie. Ministère de l'Agriculture.
La lutte contre la mouche de la carotte.
(Control of the carrot fly.)
Rev. hort. Algér., 1957, **61**: 111-12.

Alternative recommendations are: (1) dusting several times at the egg-laying stage with DDT or chlordane, (2) pre-sowing soil treatment with 4%-active dieldrin, and (3) seed treatment with lindane or aldrin.

469. Hagiya, K.
The occurrence of pithy tissue in root crops. (3) The influence of cultural conditions on the occurrence of pithy tissue. [Japanese, English summary 1 p.]
J. hort. Ass. Japan, 1957, **26**: 111-20, bibl. 21.

Environmental conditions were varied in tests on Rapid Red radishes. The occurrence of pithy tissue in the roots was highest when growth was vigorous and roots were increasing rapidly in size. [For parts 1 and 2 see *H.A.*, 23: 1921 and 3139.]

470. Hagiya, K.
The occurrence of "pithy tissue" in root crops. (4) On the relation between bolting and occurrence of "pithy tissue". [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 121-5, bibl. 10, illus.

In vernalization and manurial trials it appeared that bolting was not directly responsible for pithiness in roots of Osakashi junichi radish.

471. Thompson, B. D.
Hypocotyl discoloration of radishes.
A.R. Fla agric. Exp. Stats, 1955-56, p. 105, illus.

Tests indicated that black spotting of radishes was caused by micro-organisms, infection generally occurring after harvest [see also *H.A.*, 27: 496]. Radishes commercially harvested, washed and graded, were dipped in solutions of sodium orthophenylphenate, aureomycin, streptomycin or combinations of these. Orthophenylphenate did not control spotting, and caused severe discoloration of the radishes even at low concentrations. At 100 p.p.m. streptomycin gave moderate control and aureomycin gave excellent control.

472. Wilson, J. D.
Initial and subsequent control of radish yellows by various treatments during eight successive plantings.
Abstr. in *Phytopathology*, 1957, **47**: 538.

Several chemical compounds, including methyl bromide, formaldehyde and ethylene dibromide, which gave comparatively good control of radish yellows (caused by *Fusarium oxysporum* f. *conglutinans*) in the first planting following soil treatment, were not effective in later plantings. Terrachlor (75% pentachloronitrobenzene) and PRD (3,4-dichlorotetrahydrothiophene 1,1-dioxide) encouraged the development of the disease in both rapidity and percentage above that which occurred in the untreated soil. Treatments that gave fair control through the fourth planting (about 70–80 days after soil treatment), but were ineffective in the seventh and eighth, included mixtures of Mylone (3,5-dimethyltetrahydro-1,3,5,2H-thiadiazine-2-thione) plus Vapam (sodium methyldithiocarbamate) and EDB (ethylene dibromide) plus Picfume (trichloronitromethane), all used at only ½ the concentrations of single rates. Similar mixtures of Mylone and Picfume and of Vapam and Picfume continued to be quite effective in the last 2 plantings. Only 3 of the 20 compounds used in 40 different treatments were still giving good control in the last (eighth) planting, made about 130 days after treatment. Of these, chloropicrin was the most durable and effective, followed by Mylone and Vapam. Even a standard treatment with steam at a temperature of 180°–200° F. for 2 hours failed to give worthwhile control of this disease beyond the fourth planting, because of a gradual build-up of the causal organism.

473. Thorne, G. N.
The effect of applying a nutrient in leaf sprays on the absorption of the same nutrient by the roots.
J. exp. Bot., 1957, **8**: 401-12, bibl. 5.

Swedes were grown in nutrient solutions containing different concentrations of P. The leaves of test plants were sprayed or painted with P^{32}-labelled sodium phosphate and those of controls with distilled water. Foliar application of P did not affect P uptake by roots from low or moderate P supplies, but reduced that from high P supplies.—Rothamsted exp. Stat., Harpenden.

Salad crops.

(*See also* 396, 401, 404, 405, 408, 534x, y.)

474. Poljakoff-Mayber, A., Goldschmidt-Blumenthal, S., and Evenari, M.
The growth substances content of germinating lettuce seeds.
Physiol. Plant., 1957, **10**: 14-19, bibl. 17.

The possibility that an excess of IAA might be the mechanism preventing germination of light sensitive ttuce seeds was investigated. No IAA was found in e dry seeds. Growth promoting substances appear in edlings only when germination proceeds. Two acidic owth-inhibiting substances were the only growth-tive substances present in the dry seeds. These bstances apparently disappear when germination roceeds. A variety of other active substances appear ring germination. The chemical nature of the growth-hibiting substances in the dry seeds and the reaction these substances to light are still not known. The haviour of the growth inhibitors found by Wareing nd Foda [*Nature* (in press)] is similar to those found the present authors. Further investigations by oldschmidt-Blumenthal have shown that some of e acid substances extracted from lettuce seeds inhibit eir germination. [From authors' summary.]—ebrew Univ., Jerusalem.

475. Evenari, M., Neumann, G., and Stein, G.
Action of blue light on the germination of seeds.
Nature, 1957, **180**: 609-10, bibl. 4.

n experiments with lettuce seeds, var. Grand Rapids, e blue region of the spectrum showed an inhibiting fect on percentage germination during the first 6 hours ter imbibition, but a notable promoting effect after bout 10 hrs. The results are compared with those r red and far-red light [see *H.A.*, 24: 1614].—Hebrew niv., Jerusalem.

476. Majmudar, A. M., and Hudson, J. P.
The effects of different water-regimes on the growth of plants under glass. II. Experiments with lettuces *(Lactuca sativa* Linn.).
J. hort. Sci., 1957, **32**: 201-13, bibl. 15, illus.

technique is described for ascertaining the stage in the rying cycle at which water should be applied to a rop, if growth is not to suffer from lack of moisture. his stage is not necessarily correlated with any par-cular value of moisture tension as measured by soil isture tensiometers. In the early stages of establish-ent of an annual crop (e.g. lettuces) there may be no sponse to irrigation so long as roots are growing trongly into fresh areas of moist soil, even though the urface layers have dried out almost to wilting point. t a later stage, when all the available rooting zone as been occupied or when roots are no longer growing trongly, plants may respond to irrigation at relatively w tensions. A bed of coarse sandy loam soil, 75 cm. eep and at field capacity, contains enough readily vailable water to produce a winter crop of Cheshunt 5b ttuce under glass at normal spacings without further ddition of water. The variety Continuity, grown nder glass in summer, cannot obtain sufficient water or optimum growth from a similar volume of soil at ield capacity but requires watering at least once if rowth is not to suffer from lack of moisture. [From uthors' summary. For part I, on tomatoes, see *H.A.*, 5: 653.]—Univ. Nottm, Sutton Bonington.

477. Slater, W. G., and Goodall, D. W.
Nutrient interactions and deficiency diagnosis in the lettuce. III. Nitrogen content and response to nitrogen.
Aust. J. biol. Sci., 1957, **10**: 253-78, bibl. 16.

ettuce plants grown in sand culture and receiving N, P and K at 5 levels in all combinations were analysed at different stages of growth for total, soluble and nitrate N. The percentage of total N in the plant dry matter was generally increased by increasing levels of N or P supply and by K deficiency. The increase in N content with P supply depended on the level of the other nutrients, being most marked where N supply was high or K low. The increase in dry weight of the plants as a result of supplementary N supplied at 46 days from sowing was closely related to the N and P content of the plants at earlier stages, but not at all to their K content. Where total N content was used, the best forecast of response was obtained by sampling immediately before the supplementary N was applied, and when nitrate analyses were used the optimum time for sampling was two weeks earlier. [For part II see *H.A.*, 27: 2481.]

478. Schnathorst, W. C., and Weinhold, A. R.
An osmotic mechanism for resistance to powdery mildew in lettuce and peach.
Abstr. in *Phytopathology*, 1957, **47**: 533.

Resistance in lettuce to the lettuce strain of *Erysiphe cichoracearum* is negatively correlated with the combined thickness of the cuticle and epidermal wall. Resistant lettuce leaves became susceptible when placed in detached-leaf culture and when etiolated for short periods. These findings indicate that resistance is physiological. Differences in osmotic pressure appear to be a possible underlying mechanism of resistance (high osmotic pressures reflecting resistance in the host), and this mechanism may be responsible for the presence of disease gradients in lettuce plants, for resistance of young leaves of field-susceptible varieties, and for resistance of all leaves of field-resistant varieties. Resistance in the Paloro variety of peach to *Sphaerotheca pannosa* also appears to be physiological. There is a disease gradient on leaves of different ages: young peach leaves are susceptible whereas older leaves are resistant (reverse of the situation in lettuce). Resistance is directly correlated with the osmotic value of the cell sap. Sucrose solutions with osmotic value equal to those of resistant lettuce (17 atmospheres) and peach (18 atmospheres) leaves inhibited water uptake by conidia of the respective pathogens, as indicated by inhibition of germination.

Spinach.

(*See also* 391, 401.)

479. Sneep, J., and Wiebosch, W. A.
Zaadvernalisatie bij spinazie (*Spinacia oleracea* L.). **(Seed vernalization of spinach.)**
Reprinted from *Zaadbelangen*, 1957, **11**: 246-7, illus.

Germinating seeds of a quick-bolting variety (Broad-leaved Summer Prickly) and a slow-bolting variety (King of Denmark) were kept for various periods at 4° C. In both varieties the period from sowing to start of bolting was reduced by 3–4 days after vernalization. The period from sowing to flowering was reduced by 5–6 days with Broad-leaved Summer Prickly, and by 12–14 days with King of Denmark. The optimum duration of cold treatment was 16–25 days.

Tomatoes and other Solanaceae.

(*See also* 24, 48, 212, 289, 392, 396, 402, 404, 406-410, 534a, b, i, m, q, u, y, 535c, j, p, r, 597, 985, 994, 1010.)

480. Asselbergs, E. A. M.
A study on two tomato varieties in relation to canning.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. for 1956*, 1957, p. 11.

There was very little difference in chemical constitution between Geneva John Baer and Ferguson, but the latter was better for canning whole.—Centr. exp. Fms, Ottawa.

481. Tomes, M. L., and others.
Performance of processing tomato varieties in Indiana, 1956.
Stat. Bull. Ind. agric. Exp. Stat. **651**, 1957, pp. 13.

In replicated location trials of 8 varieties Homestead 2 gave the highest yields at 4 out of 5 localities and Urbana gave the second best yield at each place. In a large randomized trial, in which the yields of 14 strains and hybrids were compared, Early Red × Kokomo and 1361 × Homestead 2 gave impressive early and total yields. Among the inbred strains Purdue 1361, Indiana 88 and 4281-6 were noteworthy. The cropping data obtained from plants of some of the 260 strains planted on an observation plot are also presented. J.R.L.

482. Alpat'ev, A. V., Erina, O. I., and Bugarevič, G. B.
Principles of selecting initial material for the development of early tomatoes through hybridization. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(6): 3-9, bibl. 6.

Varietal differences in the length of the period from germination to flowering, and that from flowering to ripening, can be used for selection of parents for early ripening hybrids.

483. Višnevskij, S. I.
Development of tomatoes with an increased dry matter content. [Russian.]
Tr. Vses. n.-i. in-ta konserv. i ovoščesuš. prom., 1955, No. 5, pp. 129-35, from abstr. in *Ref. Ž.(Biol.)*, 1957, No. 3, abstr. 10284.

Breeding work at the Moscow experimental breeding station is described, which resulted in certain tomato lines producing large (68–89 g.) fruits of high (5·9–7·7%) dry matter content.

484. Maksakova, V. M.
The use of an early variety of tomato as mentor for increasing earliness. [Russian.]
Sad i Ogorod, 1957, No. 6, pp. 14-16.

F_1 hybrids of the early variety Štambovyj karlik 01185 × the late variety Birjučekutskij 20 were grafted on both parent varieties. The seedling progeny of the hybrids on both rootstocks were more productive than those of the hybrids on their own roots. Plants from grafts on the early variety, however, flowered earlier and produced higher early yields than those from grafts on the late variety. The rootstocks also affected fruit characters.

485. Bennett, L. G.
Some economic aspects of glasshouse tomato production, 1943-1953.
Misc. Cost Studies Univ. Reading Dep. agric. Econ. **31**, 1956, pp. 13, 2s.

Returns from specialist and non-specialist growers in the U.K. have shown that higher yields and profits are obtained by the former. Such growers produce most of their crop early in the season when prices are high; the difference in incomes may be partly offset by profits from winter crops earned by non-specialist growers. It is noted that yields per acre of tomatoes have shown no significant increase since 1943, in spite of technical improvements in growing.

486. Smirnov, N. A.
A trial on growing tomatoes in the winter. [Russian.]
Agrobiologija, 1957, No. 2, pp. 104-6.

In an experiment at Čeljabinsk tomatoes were grown under glass in the winter without additional artificial light. The plants were frequently fertilized, always in liquid form, at rates many times higher than those used outdoors, and in addition to NPK Mg was provided and CO_2 released. In December, 2,4,5-T at 50 mg./l. was sprayed on the flower buds to prevent bud drop. Yields were low, 1·6 kg. per sq. m., in the first year, but the following year they were doubled. Varieties which cropped the best are given. Where streak occurred 0·01% solution of potassium permanganate was applied.

487. Bravenboer, L.
Nieuwe mogelijkheden voor het enten van groentegewassen onder glas. **(New possibilities for grafting glasshouse vegetable crops.)** [English summary 15 lines.]
Meded. Dir. Tuinb., 1957, **20**: 707-13, illus.

Studies were carried out to find suitable tomato rootstocks which were resistant to soil-borne diseases and pests. None of the Solanaceous species tested were suitable as rootstocks, but good results were obtained with the F_1 hybrid of *Lycopersicum esculentum* × *L. hirsutum*. The stock was resistant to corky root and scion growth was vigorous. Fruit production of eggplant was increased by 100% by grafting onto tomato, as a result of better fruit set. No suitable stocks have yet been found for *Capsicum* species.—Proefst. Groent. Fruit. Glas, Naaldwijk.

488. Kramer, M.
Aspectos fisiológicos e fitopatológicos na enxertia de solanáceas. **(Physiological and pathological aspects of grafting solanaceous plants.)**
Biológico, 1957, **23**: 73-6, bibl. 1, illus.

Datura tatula, used as a rootstock for tomato, gave perfect unions, but the yield was far below that from seedling plants. With *Solanum variabile*, *S. reflexum*, *S. ciliatum*, *S. nigrum* or *S. atropurpureum* as rootstocks the yields were very low. *S. reflexum* gave good unions. In no case was resistance of the tomato to *Phytophthora* blight, viruses or pests significantly improved by grafting.

489. MASSEY, D. M., AND WINSOR, G. W.
The composition of tomato fruit.
A.R. Glasshouse Crops Res. Inst. 1954/55,
Littlehampton, 1957, pp. 55-62, bibl. 2.

ata are compared for red, yellow and green portions "blotchy" fruit and for normal fruit at different lour-phases of ripening. Percentages of blotchy uits are compared for 10 tomato varieties, of which otentate gave values outstandingly higher than the st. Its sap was lower than that of the other varieties acidity and electrical conductivity, and markedly wer in N content. Variations in titratable acidity, p solids, reducing sugars, nitrogen, conductivity and y matter of fruits of all 10 varieties are shown for ly, August and September. [For earlier work see .*A.*, 26: 3840.]

490. COOPER, A. J.
Further observations on the growth of the root and the shoot of the tomato plant.
A.R. Glasshouse Crops Res. Inst. 1954/55,
Littlehampton, 1957, pp. 88-95.

urther growth studies of the tomato have been made d showed that (a) all the organs of the plant underent sudden pronounced changes in development tween early May and early June, (b) there was a clic pattern of vigour of development of laterals that as related to the position of the trusses on the main em. As a criterion of trends of growth in the root stem the number of new roots appearing in a glass nel has been shown to be more sensitive than the al number of roots present or the total length of ots present. [Author's summary. See also *H.A.*, : 699 and 3821.]

491. SHEARD, G. F.
The effect of light on the tomato crop.
Tomato and Cucumber Mktg Bd J., 1957,
6(2): 45, from abstr. in *Agric. hort. Engng*
Abstr., 1957, **8**, No. 970.

he growth rate of the young tomato plant is largely product of the light intensity and its duration. aximum light transmission in glasshouses can be ised to about 75% of the incident light by an east to est orientation, using a minimum of opaque conruction material, and by shaping the roof so as to ve a minimum reflection of low-angle winter sunlight. he use of high-pressure mercury vapour lamps to upplement natural light up to 18 hr per day is econonical during the propagating period. A light intensity about 400 f.c. at plant level is required, but the air mperature should be kept below 60° F.

492. BUKOVAC, M. J., WITTWER, S. H., AND TEUBNER, F. G.
Gibberellin and higher plants. VII. Flower formation in the tomato.
Quart. Bull. Mich. agric. Exp. Stat., 1957,
40: 207-14, bibl. 8.

n 20 varieties GB (100 p.p.m. aqueous foliar spray) ncreased node numbers and reduced flower numbers n the first clusters and as a result greatly accelerated rowth, so that flowering occurred earlier than in the ntreated plants. This may be advantageous with arly determinate varieties, but not with early or late ndeterminate varieties.

493. SALTER, P. J.
The effects of different water-regimes on the growth of plants under glass. III. Further experiments with tomatoes *(Lycopersicum esculentum* Mill.).
J. hort. Sci., 1957, **32**: 214-26, bibl. 26.

Further experiments are described on the water relations of the tomato plant under glasshouse conditions [for earlier work see *H.A.*, 25: 653]. The period from planting to senescence was divided into three physiological phases, namely, from planting time until the first fruit began to develop, from commencement of fruiting until the first fruits ripened and were picked, and from this latter stage until senescence at the end of the season. The experiments were carried out to determine the optimum water-regime during each of these phases. Results indicated that, when tomatoes were planted in about 25 inches of sandy loam soil at field capacity, further applications of water to the plants before fruiting reduced final yield of fruit. After fruiting had started, maximum growth and yield was obtained from plants growing in soil maintained near field capacity. Changing the water-regime when fruit picking commenced resulted in reduced growth and yield. [Author's summary.]—Univ. Nott., Sutton Bonington.

494. SLATYER, R. O.
The influence of progressive increases in total soil moisture stress on transpiration, growth, and internal water relationships of plants.
Aust. J. biol. Sci., 1957, **10**: 320-36, bibl. 57.

The response pattern of tomato (*Lycopersicon esculentum*), privet (*Ligustrum lucidum*) and cotton (*Gossypium barbadense*) showed a close relationship to water stress, and in each species growth (as total dry weight) did not continue beyond a stress value such that there was zero turgor pressure in the tissue of the adult leaves. In privet and cotton stem elongation also ceased at this value; in tomato it continued until higher stress levels developed. These results indicate that the permanent wilting percentage of any one soil is determined by the osmotic characteristics of the plant under study rather than by any soil characteristic. At high stress levels there was strong evidence of nocturnal absorption of water directly from the atmosphere and its accumulation in the tissues of the shoots of two of the species. Although a diffusion gradient appeared to exist favouring movement of water out of the plant into the soil, no evidence of such movement was obtained. [From author's summary.]

495. WINSOR, G. W., AND DAVIES, J. N.
Uniformity trials in tomato houses B1-4, C1-4.
A.R. Glasshouse Crops Res. Inst. 1954/55,
Littlehampton, 1957, pp. 84-7, bibl. 1.

In some instances crop yield was positively correlated with soil pH (rising with increasing pH), with available soil P and K and with soil organic matter, the highest coefficients being those for available P. Leaf K was significantly related to crop yield.

496. GLASSHOUSE CROPS RESEARCH INSTITUTE.
Tomatoes.
A.R. Glasshouse Crops Res. Inst. 1954/55,
Littlehampton, 1957, pp. 27-36.

In a spacing experiment yields of the variety E.S.5 were reduced by 18·6% when the normal planting density of 16,000 plants per acre was halved, but were little affected by other treatments. The variety Potentate, however, normally yielding 104·46 tons per acre (compared with 78·53 for E.S.5) gave only 85·62 tons at half density, 106·23 tons at 24,000 plants per acre, 95·22 tons when alternate plants at 16,000 per acre were stopped at the 5th truss and all side shoots were removed, and 106·23 tons when a shoot from an adjacent plant was trained into the space above each stopped plant. A cultural trial with Potentate showed the beneficial effect on yield of removing side shoots when very small. In variety trials the Cheshunt selection of Potentate was unsurpassed in yield.

497. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med beskæring og opbinding af frilandstomater. (**Pruning and staking trials with outdoor tomatoes.**)
Tidsskr. Planteavl, 1957, **61**: 555-6.

Unstaked plants yielded 20% fewer first-grade fruits but a slightly earlier crop than staked plants. Differences between pruning treatments were slight. The trials were carried out at 3 Danish experiment stations between 1952 and 1955.

498. HALL, C. B., AND DENNISON, R. A.
The influence of nutrition on tomato fruit disorders.
A.R. Fla agric. Exp. Stats, 1955-56, pp. 97-8.

Different levels of N in the nutrient solution had no effect on vascular browning of the fruits. Samples of tomato fruits infected with gray wall were significantly higher in N, total pectin and acid-soluble pectin than normal fruits. Calcium deficiency symptoms appeared to be related to flower formation, and symptoms became more severe at about the time of inflorescence appearance.

499. FISKELL, J. G. A., AND YUAN, T. L.
Effect of minor element sources on the yield and composition of late staked tomatoes.
Proc. Soil Crop Sci. Soc. Fla 1956, 1957, **16**: 185-97, bibl. 20.

Blossom-end rot occurred when tomatoes were grown on acid soil even in the presence of a comparatively large amount of Ca in the fertilizer. Little benefit resulted from B, Co, Cu, Mn, Mo or Zn additions to the fertilizer. Further, 0·1% of a minor element in the fertilizer evidently was toxic in a dry season when the fertilizer was banded near the plants, although a mixture of the minor elements was not. Maneb and zineb were found to be toxic in the soil, and therefore indiscriminate use of these or other pesticides which add heavy metal residues to the soil must be considered as a factor in tomato production which may be detrimental both to quality and quantity of fruit. From these studies it is concluded that banded application of FN-501 (powdered frit containing 12·3% Fe, 4·9% Mn, 4% Zn, 2% Cu and 2% B) at 20 lb. per acre might not be excessive, but that FN-502 (3·9% Fe, 9·7% Mn, 4% Zn, 2% Cu and 2·8% B) should be used at a lower rate, possibly 5 to 10 lb. per acre. Granular sources of banded minor elements were found to be excessively active at the rate of 40 lb. per ton of fertilizer in this experiment. Under the particular conditions of this experiment, the degree and character of the detrimental effect of the minor element sources varied, depending on the element involved or whether a mixture was used. In some cases fruit and leaf composition were found to be altered for elements other than the minor element applied. [From authors' conclusions.]

500. HEENEY, H. B.
Further studies of the relationship of soil phosphorus tests to the phosphatic fertilizer requirement of the tomato.
Canad. J. Plant Sci., 1957, **37**: 347-52, bibl. 4.

Two proportionality constants have been calculated for use in predicting the fertilizer requirement of tomato crops. The c_1 constant relates the P soil test value (in lb. P_2O_5 per acre) to the percentage sufficiency of soil P, while the c constant permits estimation of the fertilizer requirement from the soil test value. Trials have indicated that the mean values established for the constants are reasonably satisfactory for predicting the P fertilizer requirements when the Bray method for acid-soluble plus adsorbed P is used.—Canad. Dep. Agric., Ottawa.

501. MESSING, J. H. L.
Boron in the nutrition of tomatoes.
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 79-84, bibl. 6, illus.

The effects of B deficiency on plant height, vegetative growth, fruit production, and B and dry matter contents of leaves and fruit are reported from sand-culture experiments with tomatoes. Of the B concentrations used, 0·2 p.p.m. was nearly optimal while 0·02 p.p.m. caused some chlorosis and markedly decreased yield and quality of fruit. This and lower concentrations resulted in stem tip necrosis, which occurred in 60 days at 0·02 p.p.m. and in 24 days at 0·001 p.p.m. B deficiency caused orange and purple pigmentation in the leaves. At 0·02 p.p.m. the fruit was ridged, large and affected by "corky back". Excess of B (2 p.p.m.) produced marginal leaf scorch but did not greatly affect plant growth: fruit size and yield were somewhat below those of the 0·2 p.p.m. level, but fruit shape was good.

502. WILKINSON, B.
Boron in the glasshouse tomato plant.
Nature, 1957, **180**: 666, bibl. 4.

Boron-deficiency symptoms appeared on tomato plants grown in a silver-sand medium supplied with a minus-B nutrient solution. No deficiency symptoms occurred in plants similarly fed but growing in composts. Sample analyses of tomato plants from various commercial nurseries showed that B contents decreased markedly as the season progressed. It is considered that B deficiency is unlikely to be of economic importance with tomatoes.

503. ECK, P., DRAKE, M., AND STECKEL, J. E.
Calcium uptake by tomatoes as influenced by nature and per cent of calcium saturation of Ca-H-clay systems.
Soil Sci., 1957, **84**: 145-54, bibl. 12, illus.

Kaolin at both 45% and 90% Ca saturations was a better supplier of Ca from a Ca-H system to tomato nts than Wyoming bentonite at 45, 60, 75, or 90% saturation. Not until saturation exceeded 75% did Ca ion uptake by tomato from Ca-H bentonite rease appreciably. No increase in Ca uptake was tained by increasing Ca saturation on kaolin under e conditions studied. If tomato plants were grown a soil that was primarily a Ca-H colloid possessing montmorillonitic-type colloid, enough lime theoretilly would have to be added to raise the saturation of a to 90% before any appreciable quantity of Ca would come available. The application of complementary itions such as the heavy application of K, Mg, NH_4 rtilizer on vegetable soils may serve to increase ailability of Ca at lower saturations. Roots of mato plants did not grow in K-H kaolin or K-H ntonite. Greater migration of Ca from root to ay occurred in the K-H bentonite than in the kaolin. rom authors' summary.]—Univ. Mass.

504. ROGERS, B. J.
The interaction of chelated iron and 2,4-D in tomato plants.
From abstr. in *Proc. 13th N. centr. Weed Control Conf., 1956*, p. 7.

eaf epinasty from application of 2,4-D(amine) was elayed 12–24 hours in tomato plants which had ceived a chelated iron compound (38·7 mg. Fe_2O_3) days before application of the 2,4-D. Other experiments showed that the 2,4-D in the treated plants was t translocated as far as in the control plants.—*Weed str.*, **6**, No. 1447.

505. SELMAN, I. W., AND GRANT, S. A.
Some effects of nitrogen supply on the infection of tomato plants with tomato spotted wilt virus.
Ann. appl. Biol., 1957, **45**: 448-55, bibl. 17.

sceptibility of tomatoes to spotted wilt virus and eir virus content were increased by added nitrogen. he period between inoculation and the appearance of mptoms was decreased by increasing nitrogen to a nt slightly greater than the optimal level for growth, ut was increased by additional application. Infected ants with added nitrogen showed abnormal leaf mptoms and no browning. Nitrogen, phosphorus nd magnesium analyses showed that these symptoms ere related primarily to nitrogen content. Such eaves contained more virus than bronzed leaves.—Vye Coll., Kent.

506. VAN DER BOON, J., AND ROORDA VAN EYSINGA, J. P. N. L.
Stikstofwerking van stalmest en stikstofbemesting bij tomaten en bonen onder glas. **(The nitrogen effect of farmyard manure and nitrogen fertilizers on tomatoes and beans grown under glass.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1957, **20**: 442-9, bibl. 8.

n a dutch-light structure tomatoes and beans were iven one dose of farmyard manure (about 11 tons/cre) or increasing N levels in nitrochalk. Nitrogen ptake was calculated from leaf analysis figures. Absorption from nitrochalk was more efficient than rom farmyard manure, but there was no indication hat N uptake under glass was greater than from soil n the open. The optimum N application for tomatoes bearing 7 to 8 trusses was 1½ cwt./acre applied just before or after transplanting; for french beans the optimum N dressing was 70 lb./acre.

507. FUJIWARA, A., AND IIDA, S.
Biochemical and nutritional studies on potassium. I. Effects of potassium on the respiration of higher plants. II. Potassium in relation to the carbohydrate metabolism of higher plants. III. On the leaching extraction of potassium from the higher plants.
Tohoku J. agric. Res., 1955, **6**: 57-65, bibl. 28; 67-74, bibl. 7; 1956, **7**: 85-101, bibl. 23.

The respiration rate of tomato seedlings in culture solution was markedly increased by K deficiency, responding notably even to slight reduction of K supply. The effect was not enhanced by adding Fe. Potassium deficiency reduced the carbohydrate reserves and increased the transpiration rate. Data are presented on the rate of leaching of K from fresh and wilted tomato leaves in distilled water with and without respiration-inhibiting substances. The rates of K leaching and respiration inhibition were not always parallel. Leaching of K was increased by low levels of N and P in the culture solution.

508. LINGLE, J. C., HOLMBERG, D. M., AND ZOBEL, M. P.
Zinc deficiency of tomatoes.
Calif. Agric., 1957, **11**(9): 10-11, illus.

Zinc deficiency has proved fairly widespread among canning tomato crops grown in parts of California. The symptoms, however, have not resembled the little-leaf symptoms previously reported in glasshouse tomatoes. Instead, plants in the field are severely stunted and the leaves are much thickened and curled and show marked marginal and interveinal yellowing. In trials on affected areas very large yield increases have followed the application of Zn both at the time of transplanting and after deficiency symptoms first appeared. Differences between Zn applied as sulphate, chelate (EDTA) or oxide in transplant water, as sprays or dusts or as side dressings have generally been slight, but it would appear that soil applications are likely to be the most effective when used at the time of transplanting and foliar applications when treatment is applied to established plants.—Univ. Calif., Davis, etc.

509. HACK, H. R. B.
A note on the spatial variability observed in tensiometers in a border of glasshouse tomatoes.
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 96-100, bibl. 1.

The siting of tensiometers must take into account variation of spatial trends with time. For instance, if it were desired to prevent the tension in the border rising above a certain level it might be necessary to have an instrument at the foot of the plant for use at one stage and midway between plant rows for use at another. This problem requires investigation as a function of variety, planting distance and growing conditions. The use of an arithmetic mean tension to characterize the level of moisture stress at any one time may not be valid and may inadequately utilize the information in the data, if this does in fact give an indication of spatial variability of root activity. The trends shown by tensiometers should be related to observations on the root development of the plant with particular consideration of the root death phase already studied by E. R. Leonard [see *H.A.*, 26: 3821]. [From author's conclusions.]

510. Davies, J. N.
Steam sterilization studies.
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 70-9, bibl. 35, illus.

Tomatoes (var. Potentate) were grown in maiden loam of pH 5·3 and in the same soil steamed, with and without the addition of lime or superphosphate or both. Symptoms of Mn toxicity appeared after a week in plants in unlimed soil. In steamed superphosphate-treated soil such symptoms (chlorosis and stunting) were marked by the end of 3 weeks. Where lime had been added, the plants developed slight and transient chlorosis, afterwards becoming green and healthy. Plant tops were analysed for N, P, K, Ca and Mn. Liming considerably increased uptake of N and K from steamed soil. Uptake of Mn from limed, steamed soil was 4–5 times as high with superphosphate present as without it.

511. Alexander, L. J.
Researches for the control of diseases of greenhouse tomatoes.
42nd annu. Proc. Ohio Veg. Grs' Ass., 1957, pp. 81-2, 84.

Work in progress at the Ohio Agricultural Experiment Station on blotchy ripening, Fusarium wilt, tobacco mosaic and leaf mould is outlined, with special reference to breeding and selection for resistance. To date the variety Ohio W-R Seven, introduced in 1956, shows the best promise; it is immune to Fusarium wilt and highly resistant to pox and blotchy ripening. [See also note 534a.]

512. Cox, R. S., and Hayslip, N. C.
Recent developments on the control of foliar diseases of tomato in South Florida.
Plant Dis. Reptr, 1957, **41**: 878-83, bibl. 8.

The tomato growing season in south Florida may be divided into 3 periods, each characterized by certain weather patterns and accompanying diseases. In field trials information was obtained on control of bacterial spot, late blight, gray leaf spot, and gray mold. Streptomycin was less effective than copper against bacterial spot; a mixture of the two was more effective than either alone. Under conditions of one of the worst late blight epiphytotics in the history of south Florida, maneb and zineb provided control which was superior to that of any other material tested. Zineb with thiram, dichlone or ferbam, each at reduced dosages, provided control equal to that of zineb. Dyrene was most effective against gray leaf spot, maneb and zineb intermediate, and dichlone least effective. Plots sprayed with dichlone, dichlone-Dyrene mixture, and dichlone-copper-Dyrene-streptomycin mixture contained the least amount of gray mold, but not significantly less than [those sprayed with] zineb in mixture with thiram, ferbam or copper-Agrimycin. Maneb, zineb and nabam-zinc sulfate plots contained the greatest amount of gray mold. Nabam-zinc sulfate again caused moderate injury. The copper-Agrimycin-Dyrene-dichlone mixture caused a light to moderate leaf distortion. [Authors' abstract.]—Univ. Fla Everglades Exp. Stat., Belle Glade.

513. Read, W. H., Hughes, J. T., and Smith, R. J.
Crop protection.
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 51-4, bibl. 3.

Stem rot of tomatoes (*Didymella lycopersici*) was retarded in development, but not fully controlled, by treating lesions with pastes containing 10% of the sodium salt of either 4-chlorobenzald-α oxime or salicylanilide. Neither griseofulvin nor 2-hydroxycinnamic acid had any inhibiting effect on the disease. Karathane was more effective as a high-volume spray than as a dust against cucumber mildew (*Erysiphe cichoracearum*), but crop injury and labour costs were less with 10-day-spaced applications of 2% dust at 15 lb. per acre than with the technical product sprayed every 3 weeks at 0·012% w/v. Aphids were completely eliminated from carnation plants under glass by soil treatment with 0·04% demeton methyl, but similar use of 0·86% schradan gave poor results. Foliar spraying with the former (as Metasystox) at 0·05% and with schradan at 0·08%, or with γ-BHC at 0·012%, parathion at 0·01% or malathion at 0·02%, was not as effective as demeton-methyl soil treatment, which also gave complete control of red spider mite (*Tetranychus telarius*) in later tests on carnations. The technical product is unsuitable for spraying on flowers because of its persistent unpleasant odour. A method is outlined for determining parathion residues on crops in the presence of azobenzene.

514. Williams, P. H., and Howles, R.
Plant pathology.
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 44-6, bibl. 2.

Treatment of virus-infected tomato seeds with saturated 2-chlorophenoxyacetic acid for 6 days completely inactivated the virus. Promising results were also obtained upon rooted cuttings of chrysanthemums infected with flower-distorting virus. The application of 3-chlorophenoxyacetic acid and 2,4-dichlorophenoxyacetic acid respectively to the soil resulted in 7% and 22% of the plants being free from the virus after six months. [See also *H.A.*, 27: 3420.] [Authors' summary.]

515. Sturgess, O. W.
Leaf shrivelling virus diseases of the tomato.
Qd J. agric. Sci., 1956, **13**: 175-220, bibl. 34, illus.

Detailed descriptions are given of the incidence and characteristics of, and the damage done by, three virus diseases of the tomato important from the autumn to the spring in south east Queensland, namely leaf shrivel, yellow shrivel and fern-leaf shrivel.

516. Izrail'skij, V. P., and Karpovskaja, S. H.
Internal infection of tomato seeds with bacterial canker as a factor in the spread of the disease. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(6): 22-6, bibl. 8.

ed transmission of bacterial canker, *Corynebacterium chiganense*, occurred in 2 out of 4 tomato varieties, d was not more than 0·73%. Soil contaminated th diseased plant material appears to be the main urce of infection.

17. Lloyd, P. J., and Crossan, D. F.
Irrigation and disease control: tomato anthracnose and potato seed-piece decay.
From abstr. in *Phytopathology*, 1957, **47**: 452.

he percentage of anthracnose-infected fruits was higher tomatoes under irrigated than under non-irrigated nditions on unsprayed plants. Both maneb and neb gave significant control in both irrigated and n-irrigated blocks. Maneb-treated plants produced wer infected fruits under irrigation than did zineb-eated plants.

18. Graham, K. M., and Donaldson, A. G.
Spraying tomatoes for the control of leaf spot, early blight and late blight.
Canad. J. Plant Sci., 1957, **37**: 385-91, bibl. 3.

mato leaf spot (*Septoria lycopersici*), early blight *lternaria solani*) and late blight (*Phytophthora festans*) were controlled effectively by 6 applications the fixed Cu spray COCS 55 or of Manzate. There as no synergistic action when 3 sprays of Manzate re followed by 3 of COCS, or when tank mixtures the 2 materials were applied.—Canad. Dep. Agric., tawa.

9. Scheffer, R. P., and Collins, R. P.
Pathological respiration in *Fusarium*-infected tomato plants.
From abstr. in *Phytopathology*, 1957, **47**: 533.

spiration in leaves of tomato plants was stimulated ortly after infection with *Fusarium oxysporum* f. *copersici*. Nine to 14 days later oxygen uptake by seased leaves was as much as twice that of healthy ntrols. Both ethylene and fusarinic acid were minated as causes of pathological respiration. Treat- ent with 2,4-dinitrophenol stimulated oxygen uptake leaves from infected plants to the same degree that it imulated oxygen uptake in healthy leaves. The ratio f CO_2 production in nitrogen to CO_2 production in ir did not differ materially in diseased and healthy aves. It was tentatively concluded that pathological espiration does not depend on uncoupling reactions r on interference with the Pasteur effect. Leaf ssues became increasingly less sensitive to malonate s the disease developed.

520. Dimond, A. E., and Corden, M. E.
Reduction and promotion of the development of Fusarium wilt of tomato by gibberellic acid.
Abstr. in *Phytopathology*, 1957, **47**: 519.

ibberellic acid (GA) accelerated the growth of tomato lants for 2 weeks after application, but untreated lants eventually became as tall as treated ones. reatments did not affect root development. One onth after tomato plants were inoculated with *usarium oxysporum* f. *lycopersici*, Fusarium wilt ymptoms in plants sprayed with 5 p.p.m. GA at, or 1–2 weeks prior to, inoculation were less severe than symptoms in unsprayed plants, whereas those in plants sprayed with 10 or 20 p.p.m. were more severe. Thus GA, after its growth effect has disappeared, continues to affect resistance of tomato to Fusarium wilt. In both cases, however, the effect on disease development was greatest when GA was applied on the day of inoculation, and least when applied 2 weeks before inoculation. Also its effect on disease severity contrasts sharply with that of auxin-like growth regulants, which increase wilt resistance of tomatoes as concentration increases. GA had no effect on growth of *Fusarium* in culture in the range from 1 to 20 p.p.m.

521. Corden, M. E., and Dimond, A. E.
Relation of plant-growth regulating properties of naphthalene aliphatic acids to their activity in inducing disease resistance.
From abstr. in *Phytopathology*, 1957, **47**: 518.

A series of naphthalene-substituted aliphatic acids having chain lengths of 2 or 4 carbons varied in growth-regulating properties and in ability to induce resistance to Fusarium wilt of tomato. Compounds were applied as a soil drench to tomatoes prior to inoculation with *Fusarium oxysporum* f. *lycopersici*. At 10^{-5} M, α-naphthaleneacetic acid induced greatest resistance, α-naphthalenebutyric acid and its ethyl ester induced moderate resistance, and α-naphthoylpropionic acid and its ethyl ester induced slight resistance. β-Substituted naphthalenes had no effect on resistance. Growth-regulating activity of all compounds was measured in terms of capacity to inhibit root elongation, promote root initiation and delay leaf abscission. Only the capacity to inhibit root elongation was related to ability to induce disease resistance; these were directly related. Assays of the ability of compounds to inhibit root elongation can be used to forecast potency in inducing disease resistance. This growth-regulating function may play a role in resistance of tomatoes to wilt, apart from the relation of root size to inoculum potential.

522. Thomas, W. O.
Chemical control of tomato diseases.
Miss. Fm Res., 1957, **20**(2): 7, illus.

Dithane M-22, Dithane Z-78, Captan W-50 and tribasic copper sulphate reduced early blight of tomatoes and increased yields. Three types of high-clearance sprayer are described.

523. Strong, M. C.
New fungicides and fungicide combinations for tomatoes.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 563-9, bibl. 3, illus.

Tests during 1955 and 1956 have shown that, even when conditions are not particularly favourable for the development of anthracnose, ripe fruit spot and leaf blights, a good spray programme can increase tomato yields by 50%. As a result of the tests combination sprays containing ziram or zineb with fixed copper, dyrene, Maneb, Tennam 5, Tennam 7 or Manzate are recommended, according to which diseases are likely to occur. [For earlier work see *H.A.*, 25: 4046.]

J.R.L.

524. Beidas, A. S., and Higgons, D. J.
Mercury residues in sprayed crops. I. Tomatoes.
J. Sci. Food Agric., 1957, **8**: 597-600, bibl. 2.

Mercury residues have been determined on glasshouse crops of tomatoes which have been treated with mercury aerosols. The results show that in some cases 0·5 p.p.m. (as metallic mercury) may be present on the fruit as it is harvested. This mercury contamination is situated mainly in the pulp of the tomato and is a potential health hazard to the consumer. [Authors' abstract.]—Lenton exp. Stat., and Boots Pure Drug Co., Nottingham.

525. Schuldt, P. H., and Bluestone, H.
Nematocidal properties of 3,4-dichlorotetrahydrothiophene-1,1-dioxide (PRD).
Contr. Boyce Thompson Inst., 1957, **19**: 63-75, bibl. 7, illus.

The *cis* (PRD) and *trans* (ORD) isomers of 3,4-dichlorotetrahydrothiophene-1,1-dioxide, as well as the dehydrochlorination product 3-chloro-2,3-dihydrothiophene-1,1-dioxide (FRD), had a high order of nematocidal activity as measured by evaluation against root-knot nematodes (*Meloidogyne* sp.) and *Panagrellus redivivus* and by reduction of nematode populations in a field test. In greenhouse tests PRD was equal to Vapam and Nemagon for reducing the number of galls on tomato plants grown in soils infested with root-knot nematodes, while in a field test fall applications of PRD were more effective in reducing total nematode population than comparable amounts of Nemagon, Vapam or D-D. PRD has pre-emergence herbicidal properties and therefore must be used as a pre-planting treatment for many seed-sown crops. However, established tomato and tobacco plants tolerated PRD at nematocidal doses. [From authors' summary.]

526. Rabb, R. L., Steinhaus, E. A., and Guthrie, F. E.
Preliminary tests using *Bacillus thuringiensis* Berliner against hornworms.
J. econ. Ent., 1957, **50**: 259-62, bibl. 8, illus.

Results of preliminary laboratory and field tests are reported on the use of *Bacillus thuringiensis* spore suspensions against tomato hornworm, *Protoparce quinquemaculata*, and tobacco hornworm *P. sexta*. In the field the bacillus, applied at 1 g. of spores suspended in 1 gal. of water, effectively killed *P. quinquemaculata* on tomatoes. Against *P. sexta* on tobacco, the spore suspension at 2 g. per gal. gave as good results as TDE, a recommended hornworm toxicant [see also *H.A.*, 27: 2610].—Univ. Calif., Berkeley, and N.C. St. Coll., Raleigh.

527. Sorensen, H. B.
Methods of determining the optimum stage of maturity for picking green-wrap tomatoes.
Bull. Texas agric. Exp. Stat. **820**, 1955, pp. 12, bibl. 13, illus. [received 1957].

Determination of specific gravity, weight, length and width showed that under the growing and ripening room conditions of Texas an average tomato picked approximately 33 days after fruit set will ripen within 15 days.

528. Plant, A.
A low-cost farm-made tomato grader.
Comm. Gr, 1957, No. 3227, pp. 837-9, illus.

A grader is described which has been constructed by Farm Institute students, and, with 3 operators, has an output of about 8 cwt. per hour.

529. Osawa, T.
Effects of various concentrations of sodium chloride on the growth, flowering, fruit bearing and chemical composition of egg-plants in sand culture. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 9-14, bibl. 10.

In greenhouse experiments concentrations of NaCl ranging from 2,000 to 14,000 p.p.m. were used. It was found that (a) the growth of the plants was reduced in proportion to the increasing concentration of NaCl, (b) no treatment was followed by harmful effect on pollen fertility, (c) the number of flowers and the yield of fruit were lower when the higher concentrations of NaCl were used, but (d) the quality of the fruit and the seed set were not affected. Leaf analyses showed that both Na and Cl increased in proportion to the concentration of NaCl used, but that Cl accumulated at a higher rate than Na. With increasing concentration of NaCl solution leaf N and P increased slightly and leaf Mg and Ca increased to a greater extent. Leaf K was greatest when NaCl was used at 4,000 p.p.m. Carbohydrates decreased when higher concentrations of NaCl were used. J.R.L.

530. Kano, K., and others.
Studies on the thickening growth of garden fruits. I. On the cushaw, egg-plant and pepper.
Reprinted from *Mem. Res. Inst. Food Sci., Kyoto Univ.*, 1957, No. 12, pp. 45-90, bibl. 122, illus.

External and internal developmental morphology of squash, eggplant and capsicum fruits are described. In eggplant the histology of parthenocarpic and normal fruits is compared.

531. Windham, S. L.
Bell pepper tests show varieties to use in Mississippi.
Miss. Fm Res., 1956, **19**(12): 7.

For highest early yield combined with good production throughout the season, Yolo Wonder should be planted together with Oakview Wonder or Ferry's California Wonder. Plants should be spaced 18 in. apart in rows 42 in. apart.

532. Dupaigne, P., and de Laroussilhe, F.
Quelques observations sur la narangille (*Solanum quitoense*). **(Some observations on the naranjilla *(Solanum quitoense)*.)**
Fruits d'Outre Mer, 1957, **12**: 277-81, bibl. 4, illus.

Juice composition is compared for fruits from Ecuador and French Cameroun. Commercial possibilities for storage and uses of the juice are discussed. In French Cameroun the plant is very susceptible to drought. On irrigated soil a spacing of 3 m. × 4 m. is recommended. Propagation by cuttings is simple if almost all the foliage is removed. Attempts at grafting on matode-resistant rootstocks succeeded with side afts on *S. torvum*, and preliminary trials on the woody rennial *S. macracanthum* gave promising results.

Sundry.

33. Barrau, J.
Les aracées à tubercules alimentaires des îles du Pacifique Sud. **(Aroids with edible tubers in the South Pacific islands.)**
J. Agric. trop. Bot. appl., 1957, **4**: 34-52, bibl. 35, illus.

the 5 genera cultivated for food on various islands the South Pacific the most promising for selection d extension are *Colocasia* and *Xanthosoma*.

Noted.

34.

a Alexander, L. J.
Ohio W-R Seven, a new disease-resistant globe-type glasshouse tomato variety.
From abstr. in *Phytopathology*, 1957, **47**: 515.
Resistant to race 1 of *Fusarium oxysporum* f. *lycopersici* and to blotchy ripening [see also abstr. 511].

Ananjan, A. A.
Production of new tomato varieties by means of vegetative and vegetative-sexual hybridization. [Russian.]
Agrobiologija, 1957, No. **2**, pp. 58-64, illus.

Bacon, J. S. D.
The water-soluble carbohydrates of the onion, *Allium cepa* L.
From abstr. in *Biochem. J.*, 1957, **67**(1): 5p-6p, bibl. 8.
Including oligosaccharides, which are distributed unevenly in the mature bulb.

Cox, R. S.
Fungicide screening trial on onion.
Plant Dis. Reptr, 1957, **41**: 789.
Only Parzate and Thylate gave any control of tip dieback (associated with *Stemphylium* sp.).

e Cox, R. S.
Wind-whip on snap bean.
Plant Dis. Reptr, 1957, **41**: 795, illus.
Wind damage causing symptoms like aerial damping-off on young seedlings.

f Davidson, F. M., and Long, C.
A soluble phospholipase *D* in plant tissues.
From abstr. in *Biochem. J.*, 1957, **66**(2): 23p, bibl. 2.
Distribution and activity in brussels sprouts and savoy cabbages.

g Duncan, A. A.
The vegetable areas of America: Maryland.
Amer. Veg. Gr, 1957, **5**(7): 8-9, illus.

h Dutt, J. O., and Fletcher, R. F.
Vegetable crops: soil management and fertilization.
Circ. Pa St. Univ. Ext. Serv. **474**, 1957, pp. 17, illus.

i Gilbert, J. C., McGuire, D. C., and Tanaka, J.
A wider variety of horticultural types now available in root knot resistant tomatoes.
Hawaii Fm Sci., 1957, **6**(1): 5, illus.
HES Hybrid N-2 and other hybrids described.

j Gowder, R. B., and Raman, N. V.
A new ash gourd type (*Benincasa* sp.).
South Indian Hort., 1956, **4**: 132-3, bibl. 5, illus.
A new form possibly distinct from *B. cerifera* and of promise as a vegetable.

k Gowder, R. B., Venketram, T. M., and Lakshmanan, V.
A note on the trial of some American onion varieties at the College Orchards, Coimbatore.
South Indian Hort., 1956, **4**: 130-1.
None so good as the Bellary onion commonly cultivated.

l Gray, R. A.
Inhibition of local-lesion and systemic plant virus infections with a new antiviral agent, cytovirin.
From abstr. in *Phytopathology*, 1957, **47**: 522.
See *H.A.*, 27: 3492.

m Greig, J. K., and Hall, C. V.
Growing tomatoes in Kansas.
Bull. Kans. agric. Exp. Stat. **385**, 1957, pp. 40, illus.
Recommended varieties and cultural techniques.

n Guimaraes, F. F., and Torres, C. B.
Produção de variedades sintetizadas en cebola (*Allium cepa* L.). **(The production of hybrid onion varieties.)**
Reprinted from *Arch. fitotéc. Uruguay*, 1953, **5**: 297-309, bibl. 26, illus. [received 1957].
Improving homogeneity and vigour of onion varieties in Brazil.

o Haegermark, U.
Om lökflugans bekämpning. **(Onion fly control.)**
Växtskyddsnotiser, 1957, **21**: 18-19.
In small-scale trials seed treatment with dieldrin gave good results.

p Hallemans, A.
Une maladie d'actualité du poireau. **(A disease of leeks.)**
Bull. hort. Liège, 1957, **12**: 315, 322, illus.
Macrosporium parasiticum controlled by copper oxychloride, or zinc or iron carbamates.

q Hill-Cottingham, D. G.
A spectrophotometric method of analysis of chelate solutions and its application to the study of iron chelates in soils and plants.
Soil Sci., 1957, **84**: 43-9, bibl. 24.
Including a study of absorption of chelated iron by tomato plants under ordinary and red light.

r Ivanoff, S. S.
Powdery mildew intumescences on watermelon fruits.
From abstr. in *Phytopathology*, 1957, **47**: 525.
Caused probably by *Erysiphe cichoracearum* and prevented by dipping young fruits in 1 : 2,000 Karathane WP.

s Ivanoff, S. S.
The Homegarden cantaloupe, a variety with combined resistance to downy mildew, powdery mildew, and aphids.
Phytopathology, 1957, **47**: 552-6, bibl. 3, illus.
See also *H.A.*, 27: 435.

t Jenkins, J. M., Jr., and Aycock, R.
Cucumber varieties tested and approved.
Res. and Fmg N.C., 1957, **16**(1): 4-5.
Including Stono, a downy-mildew resistant variety.

u Kuppuswami, B. S.
A note on vivipary in *Solanum melongena* L.
South Indian Hort., 1956, **4**: 135, bibl. 1, illus.
Seeds of 2 varieties germinated in tender green fruits.

v Kuznecov, A. V.
Chinese methods of growing garlic. [Russian.]
Sad i Ogorod, 1957, No. 8, pp. 24-6, illus.
A description of intensive methods of cultivation both in the open and in specially constructed frames.

w McLean, D. M.
Effect of insecticide treatments of beets on transmission of yellows virus by *Myzus persicae*.
Phytopathology, 1957, **47**: 557-9, bibl. 7.

x Mayer, A. M., Poljakoff-Mayber, A., and Appleman W.
Studies on the oxidative systems in germinating lettuce seeds.
Physiol. Plant., 1957, **10**: 1-13, bibl. 17.
Studies on dehydrogenases and the effects of respiratory inhibitors.

y Nakagawa, Y.
Growing cauliflower in Hawaii.
Growing oriental cabbages in Hawaii.
Growing celery in Hawaii.
Growing tomatoes in Hawaii.
Growing broccoli in Hawaii.
Growing lettuce in Hawaii.
Growing carrots in Hawaii.
Snap bean growing in Hawaii.
Cucumber growing in Hawaii.
Bulb onion growing in Hawaii.
Ext. Circs Univ. Hawaii **370**, 1957, pp. 7, bibl. 3, illus.; **372**, 1957, pp. 7, illus.; **373**, 1957, pp. 7, bibl. 4, illus.; **374**, 1957, pp. 8, bibl. 7, illus.; **375**, 1957, pp. 6, illus.; **376**, 1957, pp. 7, bibl. 5, illus.; **378**, 1957, pp. 6, bibl. 4, illus.; **383**, 1957, pp. 11, bibl. 8, illus.; **384**, 1957, pp. 11, bibl. 14, illus.; **385**, 1957, pp. 15, bibl. 12, illus.
Varieties, culture, pest and disease control, harvesting.

z National Institute of Agricultural Botany.
37th Annual Report of the N.I.A.B., 1956, Cambridge, 1957, pp. 60.
Brief notes on vegetable variety trials and seed testing.

535.

a National Institute of Agricultural Botany.
Guide to varieties of field and vegetable crops under trial, observation and propagation 1957, N.I.A.B., Cambridge, pp. 71.

b N.S.W. Department of Agriculture, Biological Branch.
Bean rust.
Agric. Gaz. N.S.W., 1957, **68**: 257-8, illus.
Good control experimentally of *Uromyces phaseoli typica* with zineb.

c Ounsworth, L. F.
Greenhouse vegetable production and research in Canada.
42nd annu. Proc. Ohio Veg. Grs' Ass., 1957, pp. 94-5, 97-8, 100-1, bibl. 3.
Some statistical data and notes on tomato and cucumber growing.

d Parr, W. J., and Crocker, C.
Red spider mite (*Tetranychus* spp.).
A.R. Glasshouse Crops Res. Inst. 1954/55, Littlehampton, 1957, pp. 47-50, bibl. 14.
A review, including resistance to acaricides.

e Pew, W. D.
Carrots in Arizona.
Bull. Ariz. agric. Exp. Stat. **285**, 1957, pp. 25, illus.

f Pittman, J. F., Taylor, H. D., and Philhower, L. S.
Internal damage to long-type watermelons during harvesting, hauling, and loading.
Bull. S. C. agric. Exp. Stat. **448**, 1957, pp. 19, bibl. 2, illus.
Dropping and rough handling cause most damage.

g Pontoriero, P. L.
Soil fumigation for outdoor vegetable growers.
42nd annu. Proc. Ohio Veg. Grs' Ass., 1957, pp. 68-72.
For nematode control.

h Rich, S., and Horsfall, J. G.
N-Acetylanthranilic acid derivatives for control of cucumber powdery mildew.
From abstr. in *Phytopathology*, 1957, **47**: 532.
Good control obtained.

i Simpson, S. C.
Keep up on new watermelon varieties.
Market Grs' J., 1957, **86**(6): 20-1, illus.
Brief notes on some new varieties, including the "seedless' triploids.

SMITH, G. E.
Inhibition of *Fusarium oxysporum* f. *lycopersici* by a species of *Micromonospora* isolated from tomato.
Phytopathology, 1957, **47**: 429-32, bibl. 7, illus.

TATEBE, T.
Further studies on the behaviour of incompatible pollen in the Japanese radish. [Japanese, with English summary ⅔ p.]
J. hort. Ass. Japan, 1957, **26**: 21-7, bibl. 11.

TEMKIN, V. I.
Trials on vegetative hybridization of pea. [Russian.]
Agrobiologija, 1957, No. 2, pp. 65-9.
Three methods of grafting pea and 2 vegetative hybrids with improved qualities are described.

TRIM, L. G.
Liming and trace element problems in the bean crop.
Qd agric. J., 1957, **83**: 327-30, illus.
Deficiencies and excesses of Mn, Fe, Mo and B and effects of liming.

TURCHI, A.
La coltivazione dell'asparago. **(Asparagus cultivation.)**
Frutticoltura, 1957, **19**: 575-9, illus.
Methods and varieties in Italy.

TURCHI, A.
La coltura del carciofo Empolese. **(Growing Empolese artichokes.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 519-26, illus.
A green, non-spiny globe artichoke, not perpetually flowering.

p VNUČKOVA, V. A.
A study of the seed progeny of a tomato graft on *Cyphomandra*. [Russian.]
Agrobiologija, 1957, No. 2, pp. 49-57, illus.

q WALTER, J. M., AND LORZ, A. P.
Florigreen: a disease-resistant pole bean.
Circ. Fla agric. Exp. Stat. **S-92**, 1956, pp. 8, illus.
Resistant to rust (*Uromyces phaseoli typica*) and common and Southern bean mosaics.

r WILSON, I. S.
Growth cracks in tomatoes.
Qd agric. J., 1957, **83**: 371-4, illus.
Prevention depends on a uniform supply of soil moisture.

s WOOD, F. C., AND GOODEY, J. B.
Effects of gamma-ray irradiation on nematodes infesting cultivated mushroom beds.
Nature, 1957, **180**: 760-1, bibl. 3.
The inactivation dose for *Ditylenchus destructor* and *Rhabditis* sp. was 48,000–96,000 rep.

t YEN, D. E.
A shiny-podded mutant in pole bean. *(Phaseolus vulgaris* L.).
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 820-4, bibl. 7, illus.
Description of, and breeding tests on, a runner bean of potential commercial value.

u ZAUMEYER, W. J., AND THOMAS, H. R.
New snap and Pinto beans resistant to several diseases.
From abstr. in *Phytopathology*, 1957, **47**: 454.
Virus resistant.

TOBACCO.

General.

(*See also* 3, 13, 33, 68p, 387, 388, 589a, c, f, 985.)

36. CRAWFORD, D. E.
Aromatic tobacco production practices and requirements.
Bull. S.C. agric. Exp. Stat. **445**, 1957, pp. 35, illus.

omatic or Turkish tobacco is a minor, though ofitable, crop in South Carolina, where the main types own are Smyrna and Cavalla. This paper describes study made of production practices, with special erence to variations in the degree of mechanization, the use of fertilizers and in cultural, harvesting and ring methods, and to the effects of these variations costs and returns. The types of farm concerned and aspects of tobacco production from seedbeds to sale of the crop are described. The average yield acre was 677·5 lb. The net returns from farms ng mule-drawn equipment and from those using le- and tractor-drawn equipment were almost ntical. For stringing the harvested leaves the use wire sticks appeared to save labour as compared h the use of needles and string. Farmers with rmostatically-controlled heat units in their curing barns were better placed than farmers who relied on a combination of sheds and sun drying.

537. C.S.I.R.O., AUSTRALIA.
Tobacco investigations.
A.R. C.S.I.R.O., 1955-56, 1956, pp. 25-6.

Breeding for resistance to blue mould. *Diseases:* In field-grown tobacco side-dressed with inorganic N, blue mould spread through all the leaves, whereas it was not severe in plants grown on soil high in organic manure. Benzol vapour prevented development of blue mould in dry seedlings but was less effective when the leaves were wet. Neither zineb nor streptomycin controlled the disease in seedlings, suggesting that different strains of the fungus occur in Australia and the U.S.A. *Quality:* The best quality flue-cured leaf was obtained from plants supplied with high N and high K. The poorest leaf was produced where the K : N ratio was low.

538. BRYSSINE, P.
L'état actuel de la culture du tabac au Maroc et les possibilités d'améliorer cette culture dans l'avenir. **(The present state of tobacco growing in Morocco and future possibilities of crop improvement.)**
Terre maroc., 1957, **31**: 265-8.

Nicotiana rustica, grown for snuff, occupies one-third of the Moroccan tobacco acreage. The locally grown burley varieties of *N. tabacum* need blending with better quality imports. Varieties which have been grown successfully at the Rabat agronomic station are listed. Work in progress at various centres is outlined.

Seedling production.

539. Garmany, H. F. M., and others.
Factors in the production of healthy tobacco seedlings.
Bull. Tobacco Res. Bd Rhod. Nyasald. **6**, 1957, pp. 30, illus.

Clear and concise recommendations are given in 5 chapters dealing, respectively, with: Selection of site, fertilization, seeding and management; soil treatment for weed and eelworm control; insect pests and their control; disease control; and Turkish tobacco seedbeds.

540. Clark, F., and Dean, C. E.
Permanent seedbeds for tobacco plants.
A.R. Fla agric. Exp. Stats, 1955-56, p. 41.

In plots which had been treated continuously with calcium cyanamide and/or Nugreen since 1944, excellent control of nutgrass was obtained by applying 1·5 lb. methyl bromide to 100 sq. ft. of bed. Peat moss, vermiculite, sheep manure, Florahome peat and chicken manure were added to the methylbromide-treated plots to increase soil organic matter. Seedling counts rose, in comparison with 11 plants per sq. ft. in control plots, to 67 plants/sq. ft. with vermiculite, 61 plants with peat moss and 54 plants with sheep manure. Antibiotics used for blue mould control were most effective when applied as dusts at 0·2% and 0·4% concentrations at levels of 10 and 15 g./sq. yd. and as a spray of 3 g. of 15% wettable powder/gal. at 5–6 gal./100 sq. yd.

541. Hidaka, Z., Uozumi, T., and Shimizu, T.
Studies on the tobacco stunt disease. V. Effects of storage periods, air drying and hot water treatments of the infested soil on the infectiveness of tobacco stunt disease.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 40, pp. 31-5, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/460.

Soil retained its infectivity even after 4 years' storage. Sun-drying of the soil for 14 days did not reduce infectivity, but hot-water treatment at 55–60° C. did.

542. Hidaka, Z., Hiruki, C., and Uozumi, T.
Studies on the tobacco stunt disease. IX. Effects of soil treatment with chemicals on development of the tobacco stunt disease.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 40, pp. 61-6, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/398.

Soil treatment with carbolic acid, mercuric chloride, formalin, Ruberon, chloropicrin, carbon disulphide, DD or copper sulphate reduced infectivity to between 0 and 10%. Insecticide treatments had an indirect effect by controlling the soil microorganisms which act as vectors.

543. Hidaka, Z.
Studies on the tobacco stunt disease. XI. Control of the tobacco stunt disease.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 40, pp. 75-9, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/400.

Four methods of sterilizing tobacco seedbed soil were studied in an attempt to control transmission of tobacco stunt. The most satisfactory method was steam sterilization at 90° C. for 10 minutes. Chloropicrin gave better results than DD or ethylene dibromide.

544. Burk, L. G.
Overcoming seed dormancy in *Nicotiana*.
Agron. J., 1957, **49**: 461.

Freshly harvested seed of 13 species of *Nicotiana* soaked in 2% NaOCl for 15–30 minutes, and rinsed in acetone to separate non-viable seed, gave an average germination of 69% compared with 19% for untreated seed.

Irrigation and other cultural practices.

545. Stephen, R. C.
The influence of planting date on tobacco growth and on the incidence of cercospora leafspot disease in Southern Rhodesia.
Emp. J. exp. Agric., 1957, **25**: 291-300, bibl. 20.

In experiments carried out in two seasons (1952/3 and 1953/4) the highest yields of best-quality leaf were obtained from early plantings, before approximately 20 November; delay in planting date thereafter resulted in large progressive yield reductions associated with correspondingly poorer quality leaf. The incidence of cercospora leafspot disease [*C. nicotianae*] was least on early-planted tobacco, and as planting date became later there was first a progressive increase in spot intensity, reaching a maximum and thereafter decreasing slightly in late-planted crops. There was no conclusive evidence of a direct relationship between this disease-incidence pattern and either temperature, rainfall, or the number of rainy days. [From author's summary.]—Tob. Res. Bd Rhodesia-Nyasaland.

546. Oseledec, N. N.
The depth of cultivation of tobacco interrows. [Russian.]
Tabak, 1957, **18**(2): 14-15.

The interrows in tobacco were cultivated 4 times in the season, and 4 combinations of deep and shallow cultivation were compared. The highest yields were obtained with early deep and later shallow cultivation, i.e. 12, 12, 10 and 7 cm. respectively. This treatment also gave the lowest percentage of flowering and the best quality crop.

547. Walker, E. K.
An evaluation of Thornthwaite evapotranspiration estimates for determining time of irrigation of flue-cured tobacco.
Lighter, 1957, **27**(2): 10-16, bibl. 5.

In 3 successive years Thornthwaite evapotranspiration estimates were compared with Bouyoucos plaster of Paris moisture blocks to determine when to irrigate flue-cured tobacco grown at the Tobacco Substation, Delhi, Ontario. At each irrigation 0·9 in. water was applied by sprinkler, this being the average amount ded to raise the surface 1 ft. of the loamy sand soil field capacity. In each year an unirrigated control s included. The two irrigation schedules resulted slight differences in leaf quality and yield, but the rage returns in dollars per acre were almost identical the two methods and both were significantly higher n for the unirrigated control. It is concluded that ornthwaite evapotranspiration estimates can provide atisfactory basis for determining the time to irrigate e-cured tobacco, especially if certain minor adjust-nts are made to improve accuracy and simplify culations.

48. Clark, F., and others.
Yield and quality of flue-cured tobacco as affected by fertilization and irrigation.
Bull. Fla agric. Exp. Stats **572**, 1956, pp. 32, bibl. 25.

tal yield and high quality yield of tobacco were reased by the use of irrigation during each of ears, 1949–1951, but in one of these, 1950, the effect irrigation on total yield was not significant. One f inch of irrigation water per application gave better ults than ¾ inch when the net economic benefits re considered. Seven to 12 irrigations were required maintain a suitable soil moisture level during the ears and 13 to 15 inches of water (rainfall+irriga-n) were necessary to produce a satisfactory crop of h quality tobacco. Fertilizer at 1,600 lb. (60 lb. N, lb. P_2O_5, 160 lb. K_2O, 40 lb. MgO and 40 lb. Cl ton together with 1·9 lb. borax and 3·8 lb. each of Mn and Zn sulphates) in 2 applications increased d and improved quality more than any other ilizer mixture or rate tested. Based on 3 years' data, opping practice of lupins followed by corn and then acco combined with 1,600 lb. per acre of fertilizer 0+800 lb. split application) and ½-inch applications irrigation water produced the largest amount of h quality tobacco.

49. Clark, F., and Myers, J. M.
The effect of rates of irrigation, fertilizers and plant spacing on the yield and quality of flue-cured tobacco in Florida.
Proc. Soil Crop Sci. Soc. Fla 1956, 1957, **16**: 249-57.

n experiment [following that described in the preced-g abstract] covered a sequence of a wet, an average d a dry year. Irrigation based on a calculated timum was most satisfactory. When the number of ants per acre was 12,500, quality was poor in the rly primings and the returns were uneconomic. t 5,000 per acre quality was high but yield low. A pulation of 7,500–10,000 per acre gave the best sults. The best application rate for the 4–8–12 rtilizer, incorporating 2 units each of MgO and Cl, as 1,500 lb. per acre, half given before and half weeks after transplanting. [For earlier reports of is work see *H.A.*, 27: 589.]

550. Marcelli, E.
La soppressione dei germogli ascellari in piante di tabacco a mezzo dell'idrazide maleica. **(Suppression of axillary buds in tobacco plants by maleic hydrazide.)** [English summary ½ p.]
Tabacco, 1957, **61**: 182-90, bibl. 15.

laleic hydrazide sprays, applied to the upper leaves of tobacco plants at 0·2% or higher concentrations, supplying 80 mg. or more of the active product per plant, significantly reduced length and number of suckers. In subsequent experiments the best results were given by applying 30–60 mg. per plant, either as spray on the top leaves or directly to the cut stem after topping. The suckers developed extremely narrow leaves, whereas the uppermost leaves of the plant, partially differentiated and pigmented at the time of treatment, attained greater weight than corresponding leaves of equal size on control plants.

Nutrition.

(*See also* 589r, 722.)

551. McEvoy, E. T.
The growth and mineral content of flue-cured tobacco as influenced by reaction of nutrient solutions with ionic forms of nitrogen.
Canad. J. Soil Sci., 1957, **37**: 79-83, bibl. 9.

Studies with flue-cured tobacco in sand culture showed that the optimum reaction of the culture medium varied with the ionic forms of nitrogen supplied. Nitrate nitrogen was assimilated most efficiently at pH 5. When both nitrate and ammonium nitrogen were supplied, pH 8 was optimum. Ammonium nitrogen was assimilated by the plant as readily as nitrate when the reaction of the culture medium was favourable. The accumulation of all the major nutrient elements in the leaf tissue was influenced by the reaction of the culture medium. The ash content of the leaves was highest over the range of pH values 4 to 6, inclusive. [Author's abstract.]—Tob. Div., Canada Dep. Agric., Ottawa.

552. Bhat, N. R.
First glimpses of the way out of the impasse in the fertilizer uptake by flue-cured Virginia tobacco grown in black cotton soils of Andhra Pradesh.
Indian Tobacco, 1957, **7**: 85-96.

In numerous experiments with flue-cured Virginia tobacco no responses to P or K were observed, and only a small response to N in a few cases. It is suggested that this is a result of lack of adequate soil water, and that deep placement of fertilizer (6–9 in.) may induce a response in tobacco.—Centr. Tobacco Res. Inst. Rajahmundry.

553. Donadoni, S., and Tombesi, L.
Sei anni di esperimenti di fertilizzazione eseguiti presso la fattoria tabacchi de Città di Castello in Umbria. **(Six years of fertilizer experiments carried out at the municipal tobacco plantations at Citta di Castello in Umbria.)** [English summary ⅓ p.]
Tabacco, 1957, **61**: 84-97.

Increasing applications of F.Y.M. raised the concentration of the NO_3 ion in tobacco leaves and consequently increased oxidase activity. These effects were more marked in a tropical variety than in Virginia Bright. In the latter leaf analysis showed high N and P requirements in the early stages of growth and rather later accumulation of K up to the time of anthesis. Sugars were abundant. In Maryland tobacco the leaves were considerably richer in N+P+K, particularly in K, than in Virginia Bright, and the K requirement increased over a much longer period. In the tropical variety there was little variation in the proportions of N, P and K until the later phases of growth, when N and P decreased markedly relatively to K. High availability of K in the soil led to a high sugar content in the leaves and low availability to an increase of proteins and citric acid. The variety differed from Virginia Bright in losing practically all its sugar and a large amount of its cellulose and protein during curing. Fertilizer mixtures have been formulated for the different varieties on the basis of leaf analyses.

554. Fujiwara, A., and Kurosawa, M.
Studies on the biting taste of burley tobacco leaves. (Nutritional physiology of Japanese tobacco.) I. Relations between the biting taste and chemical components.
Tohoku J. agric. Res., 1954, **5**: 229-37, bibl. 9 [received 1957].

The production of burley tobacco in the cool northern parts of Japan has declined in recent years, owing mainly to its poor quality and in particular its strong biting flavour. Analyses were carried out on leaves from different parts of the stems of plants set out in the field on various dates and supplied with various manures. Low-grade leaves, with a strong biting taste, were characterized by high total and protein N contents and low carbohydrate contents. In general, the leaves of plants sown and transplanted early had a better carbohydrate/total N ratio and were of better quality than those planted a fortnight later. The effect of P on quality was uncertain.

555. Fujiwara, A., and Kurosawa, M.
Studies on the biting taste of burley tobacco leaves. (Nutritional physiology of Japanese tobacco.) II. Effect of the soil and fertilization on the formation of the biting taste with special reference to phosphate.
Tohoku J. agric. Res., 1956, **7**: 199-207, bibl. 7.

Burley tobacco, growing in pots containing 3 soils characteristic of the cooler N.E. part of Japan, was supplied with N as sulphate of ammonia, nitrate of soda and urea and with various amounts of P and K. In an alluvial soil of pH 6·0, rich in available P, the plants made excellent growth and produced tobacco of good quality, with little biting taste. In the other soils a volcanic ash and a tertiary allitic soil of pH 5·4–5·5 and both low in available P, growth was inferior, the N content of the plants higher and their biting taste more pronounced. High applications of N, of which NO_3 was the best source and NH_4 the worst, increased yields but reduced quality by lowering the soluble sugars/N ratio and accentuating biting taste. Applications of P and K improved growth, advanced maturity and increased the soluble sugars/N ratio with a marked reduction in biting taste.

556. Fujiwara, A., and Kurosawa, M.
Studies on the biting taste of the burley tobacco leaves. (Nutritional physiology of Japanese tobacco.) III. Effects of the form and the amount of the supplied nitrogen and phosphorus on the quality of the burley tobacco.
Tohoku J. agric. Res., 1957, **7**: 303-14, bibl. 20, illus.

Burley tobacco seedlings were grown in water culture with low and high levels of P and with N supplied as NO_3 or as NH_4 (actually NH_4 plus NO_3 in the proportions 4 to 1). Plants supplied with NO_3-N made much better growth than those supplied with NH_4-N and in addition their N content declined earlier and faster and their carbohydrate content increased markedly in the final growth stages. The high P level resulted in an excellent crop of high quality. The combination of high P with NO_3-N produced a higher soluble sugar : total N ratio in the plants than did low P with NH_4-N, the difference being especially pronounced in the lower leaves.

557. Hurley, B. D., Pritchett, W. L., and Breland, H. L.
The effect of various soil treatments on the manganese content of cigar-wrapper tobacco leaves.
Proc. Soil Crop Sci. Soc. Fla 1956, 1957, **16**: 230-7, bibl. 8.

Leaf Mn was decreased by soil applications of calcium hydroxide or Mg. An increase of Mn uptake following soil applications of potassium sulphate was indicated, but needs confirmation. A definite increase of leaf Mn resulted from increasing N application, the effect of ammonium nitrate being much greater than that of cottonseed meal. Triple superphosphate increased leaf Mn more than did steamed bone meal. Values as high as 600 p.p.m. of Mn were found in the top leaves of plants receiving inorganic N and P, but having insufficient Ca and Mg.

558. Ivanovski, N. P.
The influence of magnesium on the yield and quality of tobacco. [Polish.]
Udobrenie i Urozhai, 1956, **1**(9): 34-8, from *CORESTA Inf. Bull.*, 1957, Abstr. 698.

Magnesium applications to tobacco grown on highly podzolic soils markedly improves yield and quality. If the soil reaction is alkaline or nearly neutral, Mg does not increase yield but improves quality. Mg applications should not exceed 40 kg./ha.

559. Schmid, K.
Die Bedeutung der Kalidüngung im Tabakbau. **(The importance of potash manuring in tobacco growing.)**
Dtsch. Tabakb., 1957, **37**(7), from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/282.

Optimum root growth of Havana IIc was obtained at applications of about 63 mg. K_2O/100 c.c. of soil. Higher applications inhibited root growth. Strong root growth enabled the plants to withstand drought. Satisfactory K manuring improved tobacco quality.

560. Hutcheson, T. B.
Sodium and potassium interrelationships in soil and mineral systems and their effects upon the nutrition of flue-cured tobacco.
Diss. Abstr., 1957, **17**: 468-9, being *Publ.* 20,173 of 143 pp.

Flue-cured tobacco plants were grown in media composed of various mineral materials and supplied with nutrient solutions containing K and Na. Plants grown in granitic or feldspathic materials high in K contained re K than those grown in quartz or high sodium spar sands, particularly when Na was supplied at levels of K in the nutrient solution. There was indication that the presence of Na in the nutrient ution appeared to affect the availability of the K m the mineral materials. Neither Na nor K applied soils in field experiments appeared to affect the ase of either element from mineral reserves. The h K requirement of flue-cured tobacco was apparent oth the greenhouse and field studies. Sodium did appear to affect plant growth except when K was iting; in such cases Na delayed the appearance and uced the severity of K-deficiency symptoms.—. St. Coll.

1. Gilmore, L. E.
Sodium and sulphur in tobacco fertilizers.
Lighter, 1957, **27**(3): 1.

e preliminary results [no details are given in this cle] of several experiments at Ottawa suggest that cium sulphate and sodium carbonate may be applied ne or in combination, and that Na may replace some all of the K usually applied, without having any nificant adverse effect on the yield or quality of acco.

Physiology and biochemistry.

(*See also* 589g, l, o.)

2. Crockett, L. J.
A study of the tunica corpus and anneau initial of irradiated and normal stem apices of *Nicotiana tabacum* L.
Bull. Torrey bot. Cl., 1957, **84**: 229-36, bibl. 11, illus.

ng seedlings of *N. tabacum* var. "Turkish" were ected to chronic Co^{60} gamma irradiation for 14 s, after which the stem apices were sectioned and pared with apices from comparable plants grown out irradiation. In irradiated stem apices peri- al divisions were observed in the first tunica layer, ereas in normal plants only anticlinal division urs in this layer. The studies lend support to the neau initial" or "ring of initiation" concept of ntefol (*Rev. gén. Bot.*, 1947, **54**: 49-80) and to the gestion of Buvat (*Ann. Sci. nat., XI, Bot.*, 1952, 199-300, and *C.R. Acad. Sci. Paris*, 1953, **236**: 9-91) that the central cells of both the tunica layers the central corpus show relatively little physiological ivity.—Dep. Bot., Columbia Univ., N.Y.

3. Owen, P. C.
Effect of ultra-violet radiation on the respiration-rates of tobacco leaves, and its reversal by visible light.
Nature, 1957, **180**: 610-11, bibl. 2.

bacco leaves were exposed to ultra-violet radiation a wavelength of 2537 A. at an intensity of 870 /cm.^{2} for 1-4 minutes; they were then detached placed in the dark and their respiration rates asured. The respiration rates increased up to 20% h increasing exposure time. This effect was reversed subsequent exposure to visible light. The relation- p between increased respiration in irradiated leaves that in leaves inoculated with tobacco mosaic us [see *H.A.*, 25: 3026g] is discussed.—Rothamsted . Stat., Harpenden.

564. Vickery, H. B., and Palmer, J. K.
The metabolism of the organic acids of tobacco leaves. XIII. Effect of culture of excised leaves in solutions of potassium bicarbonate.
J. biol. Chem., 1957, **227**: 69-81, bibl. 26.

When excised leaves of the tobacco plant (*Nicotiana tabacum*, variety Connecticut 49) are cultured in darkness in potassium bicarbonate solution, from one-fifth to one-quarter of the bicarbonate ion taken up is fixed as the carboxyl groups of non-volatile organic acids. A stimulation of the formation of citric acid occurs which is approximately the same as that observed when succinate or fumarate is made available to the leaves from solutions at approximately pH 7. It was observed incidentally that the administration of phosphate at pH 8 to the leaves also stimulates the formation of citric acid. [From authors' summary. For part XII see *H.A.*, 27: 3638.]—Conn. agric. Exp. Stat., New Haven.

565. Vickery, H. B.
The metabolism of the organic acids of tobacco leaves. XIV. On the uptake of (+)-tartaric acid from solutions in the range pH 3 to pH 6.
J. biol. Chem., 1957, **227**: 943-9, bibl. 12.

When excised leaves of the tobacco plant (*Nicotiana tabacum*, variety Connecticut 49) are cultured in darkness in solutions of sodium (+)-tartrate adjusted to reactions in the range pH 3 to pH 6, the quantities of (+)-tartaric acid found in the tissues corresponded closely with the quantities taken up as calculated from the increases in the alkalinity of the ash and the increases in sodium content. The mean recovery based upon 8 observations was $100{\cdot}6 \pm 8{\cdot}3\%$. An earlier observation [*H.A.*, 24: 2867c] that (+)-tartaric acid is not metabolized by the enzyme systems of the tobacco leaf has been confirmed, as well as the fact that this acid has little if any effect upon the normal course of the metabolism of malic and citric acids when made available from culture solutions near pH 5 and 6. At lower pH, however, there is evidence that it interferes with the metabolism of citric acid. [From author's summary.]—Conn. agric. Exp. Stat., New Haven.

566. Leete, E.
The biogenesis of the pyridine ring of nicotine.
Chem. Ind. Lond., 1957, No. 38, p. 1270, bibl. 8.

In tobacco plants nicotinic acid is a precursor of the pyridine ring of nicotine, and in animals and microorganisms tryptophane is a precursor of nicotinic acid. However, when tryptophane labelled with C^{14} was fed to tobacco plants in nutrient culture, the nicotine formed was completely inactive, and it is concluded that the tryptophane played no part in the metabolic sequence leading to its formation.—Univ. Calif., Los Angeles.

567. Palmer, J. K.
Occurrence of *l*-quinic acid in tobacco leaves.
Science, 1957, **126**: 504-5, bibl. 10.

Evidence is presented, which shows that *l*-quinic acid is a normal constituent of tobacco leaves, which suggests that it may be a precursor of chlorogenic acid.—Conn. agric. Exp. Stat., New Haven.

Disorders, diseases and pests.

(*See also* 243, 335, 526, 541-543, 545, 589b, d, e, h, k, m, p, q, s.)

568. Nomura, Y., Kurihara, T., and Tezuka, T.
Studies on the red leaf of Bright tobacco. I. Selection of strains without red leaf.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 39, pp. 1-5, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/363.

Two strains of Bright tobacco have been selected, namely strain H, which shows a low proportion of red leaf, and strain TY, which in 2 years' studies has shown no symptoms of red leaf.

569. Nomura, Y., Higase, S., and Mitake, H.
Studies on the red leaf of Bright tobacco. II. The occurrence of red leaf and its change.
Bull. Hatano Tobacco Exp. Stat., 1956, No. 39, pp. 7-16, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/364.

After topping the leaves of a red-leaf-prone strain (TR) were brighter than those of a yellow strain (HY), and before harvest small red-brown granules appeared on the leaves of TR. Curing increased the red colouring. During storage the colour changed to brown, and after heating at 90° C. it became black.

570. Porter, C. A., and Weinstein, L. H.
Biochemical changes induced by thiouracil in cucumber mosaic virus-infected and non-infected tobacco plants.
Contr. Boyce Thompson Inst., 1957, **19**: 87-106, bibl. 40, illus.

The data indicate that thiouracil induces a block in the synthesis of proteins; however, a block of the same magnitude did not occur in the synthesis of amino acids and amides. This effect apparently exists because of an aberration in nucleic acid metabolism resulting from the antimetabolic relationship of thiouracil with uracil. It is suggested that the reduction of active virus in thiouracil-treated plants is a consequence of this impaired synthetic mechanism. [From authors' summary.]

571. Porter, C. A., and Weinstein, L. H.
Effect of thiouracil on $C^{14}O_2$ fixation in healthy tobacco plants and in tobacco plants infected with cucumber mosaic virus.
From abstr. in *Phytopathology*, 1957, **47**: 531-2.

Thiouracil treatment alone increased fixation of $C^{14}O_2$ into free amino acids, sucrose, glucose, fructose, malic acid and citric acid, whereas it decreased the amount incorporated into protein. Virus infection alone increased the fixation of $C^{14}O_2$ into sucrose, glucose, fructose and citric acid, whereas it decreased the incorporation into free amino acids, protein and malic acid. The combination of thiouracil treatment and virus infection resulted in a pattern of $C^{14}O_2$ fixation similar to that produced by thiouracil alone.

572. Gigante, R.
Studio comparativo sulla istologia delle foglie di tabacco sane, mosaicate e con mascheramento dei sintomi del mosaico. **(Comparative study of the histology of healthy tobacco leaves with those showing clear and masked symptoms of mosaic.)** [English summary 6 lines.]
Tabacco, 1957, **61**: 170-81, bibl. 7, illus.

Full expression of symptoms was accompanied by pronounced histological modifications, but where symptoms were masked, leaf structure was practically normal.

573. Owen, P. C.
The effects of infection with tobacco mosaic virus on the photosynthesis of tobacco leaves.
Ann. appl. Biol., 1957, **45**: 456-61, bibl. 4.

The rate of photosynthesis of tobacco leaves infected with the Rothamsted type culture of tobacco mosaic virus was lower than that of comparable healthy tobacco leaves. The lower rate was inferred from net assimilation rates of whole plants and confirmed by direct comparisons of photosynthetic rates of inoculated and healthy leaves. The effect began within 1 hr. of inoculation. It was not caused by an effect of the virus on the stomata, and inactivated virus inoculum did not change the rates. The results indicate either a more rapid movement of virus from the epidermis into the chlorenchyma than has been previously recorded or an effect of virus infection at a site distant from the cells containing virus. [Author's abstract. For similar work on tobacco etch see *H.A.*, 27: 3648.]—Rothamsted exp. Stat.

574. Takahashi, W. N.
The inhibition of virus infection by malachite green.
From abstr. in *Phytopathology*, 1957, **47**: 535.

When tobacco leaves were inoculated with tobacco mosaic virus and floated for various periods in 4 p.p.m. malachite green solution it was found that 2- or 4-hr. treatments were as effective in inhibiting virus increase as a 6-day treatment. Established infections were also checked by malachite green, but virus that was formed before the treatment was not inactivated.

575. Kurtzman, R. H., Jr., and others.
Inhibition of tobacco mosaic virus multiplication and effects on host tobacco tissue cultures by substituted purines.
From abstr. in *Phytopathology*, 1957, **47**: 527.

Virus multiplication was inhibited by 6-methylpurine at 0·01 mg./l.; inhibition was progressively greater over the range of 0·05, 0·1, 0·25, 0·5, 1, 10, and 100 mg./l. and approached 50% at the 100-mg. level. Phytotoxicity occurred at 0·25 mg./l., and no growth occurred above 0·5 mg./l. 6-Chloropurine was neither antiviral nor phytotoxic at levels of 10 mg./l. or less, but above this level it was phytotoxic and had antiviral activity. Fifty and 100 mg./l. allowed no growth of the host tissue, but virus infectivity was reduced to about 50% of that of the control.

l P——, E.
La serra meccanizzata. **(Mechanized frames.)**
Frutticoltura, 1957, **19**: 385-7, illus.
Description of the Dvorák frame produced in Prague, fitted with devices for opening and irrigation.

m PADHYE, V. P.
A rapid method for the determination of calcium and magnesium in plant material by titration with disodium ethylenediaminetetra-acetate.
Analyst, 1957, **82**: 634-8, bibl. 5.
Method described and results obtained in analysing leaves of banana, cashew, coffee, etc.

n PINTO, J. A. G.
Pré-embalagem de frutas e produtos hortícolas. Suas relações com a normalização. (A experiência de Milão.) **(Pre-packaging fruits and horticultural products. Its relationship to standardization. (Experience in Milan.))** [English and French summaries ⅓ p. each.]
Bol. Junta nac. Frut. Lisbon, 1954, **14**: 17-28, illus. [received 1957].

o PLOCK, H.
Die langersehnte Zapfenschnittschere. **(A pair of cutters for snagging.)**
Dtsch. Baumsch., 1957, **9**: 287-9, illus.
Saves injury to man and plant.

p RENIER, A.
Classification et description des dispositifs expérimentaux. **(Classification and description of experimental lay-outs.)**
Ann. Inst. exp. Tabac Bergerac, 1954, **2**(1): 103-49, bibl. 10 [received 1957].
Includes application to tobacco.

q ROGERS, M. N.
A small electrical hygrometer for microclimate measurements.
Plant Dis. Reptr, 1957, **41**: 897-902, bibl. 21, illus.
See *H.A.*, 27: 2080.

r SCHÜTTE, K. H.
The significance of micronutrients.
Econ. Bot., 1957, **11**: 146-59, bibl. 42.
A review of their effects on plant growth, disease resistance and nutritional value.

s STOUGHTON, R. H.
Electricity in efficient horticulture.
[*Publ.*] *Seale-Hayne agric. Coll., Newton Abbot, Devon*, [1957?], pp. 18.
The George Johnstone lecture for 1956.

t VIEL, G., AND GUSSE, J. F.
Microméthode d'analyse du dibrométhane dans les fruits et les terres. **(Microdetermination of ethylene dibromide in fruits and soils.)**
Ann. Épiphyt., 1957, **8**: 165-70, bibl. 5.

u WAIN, R. L.
The chemical regulation of plant growth.
Agric. Progr., 1955, **30**(2): 79-89, illus., reprinted as *Reprint Wye Coll., Univ. Lond.* **95**.
A review, with special reference to the mode of action of growth substances. [See also *H.A.*, 27: 67m.]

v WALLACE, T.
Trace elements in plant nutrition.
J. roy. Soc. Arts, 1957, **105**: 515-34.
World Crops, 1957, **9**: 289-92, illus., and 343-5.
The Fernhurst lecture and a summary thereof.

w WYBENGA, J. M.
A contribution to the knowledge of the importance of sodium for plant life. Investigations with radioactive sodium. [A thesis.]
Kantoordruk de Goede, Wageningen, 1957, 9½×6½ in., pp. 211 plus 4 colour plates, bibl. 297, illus.
The study was carried out on oat plants.

x YOUARD, G. B.
Farm roads.
Bull. Minist. Agric. Lond. **145**, 1957, pp. 73, illus., 4s. 6d.
Principles of road construction and maintenance on farms and fruit farms.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1, 5, 65, 180d, n, o, 965, 966, 1006.)

69. ROYAL HORTICULTURAL SOCIETY.
The Fruit Year Book 1958, No. 10.
R.H.S., Vincent Square, London, 1957, 9×5½ in., pp. 176, illus., 10s.

As a result of the poor demand, it is now only possible to publish the yearbook biennially, but this issue contains almost twice as many articles as the previous one, and these cover a wide range of fruit growing interests. Several of the articles of particular interest to amateurs are concerned with growing fruit in restricted forms, but experience in growing peaches as bush trees in a Kent garden is also described. On a larger scale, impressions of commercial fruit growing in the Eastern counties of England and in Poland are described, and there is a practical article on methods of staking fruit trees. Historical aspects are covered by articles on John Laurence and his pears, on nineteenth-century English fruit books, and on the history of gooseberry, perry pear and apple growing in England. Other articles are included on hothouse vines, on apricot varieties, on red currants and on some Jamaican fruits. Recognition of fruit injuries, earwigs as orchard pests, and a fruit group discussion on the new

Mn content of the leaves increased steadily with higher leaf position on the plant. The burn test decreased after the third priming, which corresponded very closely with the decreased K contents of the tobacco leaf. The ash color became lighter from the third priming through the seventh. This may also be related to the decreasing K contents of the leaves. [Authors' summary.]

584. Bajlov, D., Stefanova, M., and Andrejčeva, M.
A rapid method for the objective determination of technical maturity in tobacco leaves. [Russian, with German summary 9 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 157-60, bibl. 17.

The sap taken from tobacco leaves, after removal of their midribs, is allowed to stand for 16–20 hours to precipitate solids. The clear fraction which remains shows polyphenoloxidase activity, the extent of which depends on the stage of leaf maturity. The greatest polyphenoloxidase activity is shown by technically mature leaves and overripe leaves show no such activity.

585. Weybrew, J. A.
Pigment changes in tobacco during natural and induced senescence.
Tobacco, N.Y., 1957, **144**(2): 18-20, from *CORESTA Inf. Bull.*, 1957, Abstr. 631.

Leaf pigments were studied in 3 varieties in relation to physiological age (position on stem) and after artificial ageing. To obtain direct comparisons half of each leaf was examined fresh and the other half after 44 hours' yellowing. In a green strain of the variety Consolation the chlorophyll content of upper and lower leaves was similar, but in the flue-cured variety 402, and still more in the burley variety Kentucky, the chlorophyll content declined from the top to the bottom of the plant. During yellowing the chlorophyll in leaves picked when immature resisted decomposition more than that in leaves picked when mature or over-mature. The carotene content of leaves increased with age, whereas the xanthophyll content declined. The water content also increased as the leaves became older.

586. Baebler, S.
Sur le brunissement du tabac. **(On the browning of tobacco.)** [French and English.]
CORESTA Inf. Bull., 1957, No. 3, pp. 7-10, bibl. 6.

The results are summarized of studies in which tobacco leaves were analysed during curing at successive stages of yellowing and browning. They show that during yellowing the contents of rutin and chlorogenic acid remain fairly constant, but once browning starts both, and especially the chlorogenic acid, decline rapidly. Proline and tryptophane decline in the later stages of yellowing and disappear altogether during browning. Arginine and other amino acids increase rapidly in the early stages of yellowing and thereafter more slowly. Red-brown coloration has followed the action of polyphenoloxidase on chlorogenic acid in the presence of proline or tryptophane, and brown-grey and black colouration when pyrrole and its derivatives were oxidised in the presence of chlorogenic acid and polyphenoloxidase.—École polytech. féd., Zurich.

587. Müller, R.
Die Umwandlung von Nikotin in den Blättern von *Nicotiana*-Arten während der Hangtrocknung. **(The transformation of nicotine in the leaves of *Nicotiana* spp. during air-curing.)** [Russian and English summaries 17 lines each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 103-10, bibl. 4.

In one of the *Nicotiana tabacum* varieties tested the nornicotine content increased slightly during drying at the expense of nicotine. Changes of alkaloid content in *N. glauca* plants grafted on a local tobacco variety were also studied.

588. Mihajlov, M. K.
Studies on soluble carbohydrates in tobacco by paper chromatography. [Russian, with English summary 7 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 201-4, bibl. 14.

Glucose, fructose and sucrose were found in naturally fermented tobacco, but only glucose and fructose following accelerated fermentation. No maltose was detected.

Noted.

589.

a Abdoh, Y.
Berichte über den Anbau und die Aufbereitung von Tabak in der Schweiz und in der Türkei im Vergleich zum Iran. **(Reports on the cultivation and preparation of tobacco in Switzerland and Turkey as compared to Iran.)**
[*Publ.*] *Univ. Teheran*, 1953, pp. 56+tables [received 1957].

b Bawden, F. C., and Pirie, N. W.
A virus-inactivating system from tobacco leaves.
J. gen. Microbiol., 1957, **16**: 696-710, bibl. 14.
Sediments from centrifuged tobacco leaf sap inactivating necrosis and ring spot viruses but not TMV.

c Benoit, R.
La culture du tabac à la Réunion. **(Tobacco growing in Reunion.)**
Rev. int. Tabacs, 1957, **32**: 103-6.
Including varieties and cultural methods.

d Berger, P.
Über Beobachtungen von Schädlingen und Krankheiten im Schattenzelt. **(Observations on pests and diseases of tobacco grown under shade.)** [Russian and English summaries 20 lines each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 36-50, bibl. 2.
Importance of soil aeration, balanced nutrition and the use of insecticides is stressed.

BERGER, P., AND KIEWNICK, L.
Der Einfluss der Stickstoff- und Phosphorsäuredüngung auf die Konzentration verschiedener Viren im Tabakblatt. I. Mitteilung. Die Veränderungen der Konzentration des TMV. **(The effect of nitrogen and phosphate manuring on the concentration of several viruses in the tobacco leaf. I. Variations in the concentration of TMV.)** [Russian and English summaries 6 lines each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 70-80, bibl. 7.
In 2 varieties TMV concentration was increased by high N but was little affected by P.

CHIBA, Y., AND SUGAHARA, K.
The nucleic acid content of chloroplasts isolated from spinach and tobacco leaves.
Arch. Biochem. Biophys., 1957, **71**: 367-76, bibl. 19.

FRISCH-NIGGEMEYER, W., AND REDDI, K. K.
Studies of ribonuclease in tobacco leaves. I. Purification and properties.
Biochim. biophys. Acta, 1957, **26**: 40-6, bibl. 10.

GIGANTE, R.
La bruciatura o fuoco selvaggio del tabacco. **(Scorch or wildfire of tobacco.)** [English summary ¼ p.]
Tabacco, 1957, **61**: 10-19, illus.
A review; control by rational fertilizing and fungicides.

HEGGESTAD, H. E., AND LAUTZ, W. B.
Some results of studies on resistance to tobacco black shank.
From abstr. in *Phytopathology*, 1957, **47**: 452.
Breeding techniques.

KIEWNICK, L.
Zum Auftreten der Tabakmauche in Mitteldeutschland. **(On the incidence of tobacco rattle disease in Central Germany.)** [Russian and English summaries 12 lines each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 51-69, bibl. 16, illus.
All varieties tested susceptible; preventive measures suggested.

KUITERT, L. C., AND TISSOT, A. N.
Insect pests of flue-cured tobacco and their control.
Bull. Fla agric. Exp. Stats **573**, 1956, pp. 34, bibl. 7, illus.

MIHAJLOV, M. K.
An unknown non-volatile organic acid in fresh tobacco and cotton leaves. [Russian, with English summary ¾ p.]
C.R. Acad. bulg. Sci., 1957, **10**: 205-8, bibl. 8.
An acid with an *Rf* value of 0·15 in both leaves.

m PHILIP, A.
Important pests of tobacco and their control, with a field key for their identification.
Indian Tobacco, 1957, **7**: 97-103, bibl. 2, illus.
Insects and nematodes.

n PYRIKI, C.
Über die Tabakfermentation. VI. Mitteilung. Die mengenmässigen Veränderungen der organischen Säuren. **(Studies on tobacco fermentation. VI. Quantitative changes in organic acid content.)** [Russian and English summaries 19 lines each.]
Ber. Inst. Tabakforsch., Dresden, 1957, **4**: 81-102, bibl. 17.
Changes during different methods of fermentation.

o RAMUNNI, A.
Sulla determinazione dei carboidrati nei tessuti vegetali, con particolare riferimento alle foglie di *N. tabacum.* **(Determination of carbohydrates in plant tissues, with special reference to tobacco leaves.)** [English summary ½ p.]
Tabacco, 1957, **61**: 191-208, bibl. 11.
Determination of reducing and non-reducing sugars, starch and dextrins.

p RAO, V. T., AND RAO, N. R.
The tobacco stemborer *(Phthorimoea heliopa* Low) in the Northern Circars; and its control.
Indian J. Ent., 1956, **18**(1): 49-56, from *CORESTA Inf. Bull.*, 1957, Abstr. 727.
Cultural measures, and BHC or DDT for control.

q TARIEL, P.
Une nouvelle technique de lutte contre les vers blancs et les taupins à l'aide des engrais composés insecticides. **(A new method of control for cockchafer grubs and wireworms by means of fertilizers containing insecticides.)**
Rev. int. Tabacs, 1957, **32**: 135-6.
Aldrin with a complete fertilizer applied to tobacco and other crops.

r TOBACCO RESEARCH BOARD OF RHODESIA AND NYASALAND.
Fertilizing flue-cured tobacco.
[*Publ.*] *Tob. Res. Bd Rhod. Nyasald*, 1957, pp. 12.
Recommendations for seedbeds and fields.

s TODD, F. A.
Sore shin and southern stem rot of tobacco.
Ext. Folder N.C. agric. Ext. Serv. **140**, 1957, 1 folded sheet, illus.
Caused by *Rhizoctoria solani* and *Sclerotium rolfsii*, with methods of reducing damage.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 649r.)

590. FERRARA, A.
Tecnologia delle spezie: vaniglia ed altre. **(Technology of spices: vanilla and others.)**
Riv. Agric. subtrop., 1957, **51**: 269-98, illus.

Data for vanilla include: composition of pods from different countries; preparation; toxicity to workers employed in preparation and handling of the commercial product; adulteration; uses; production and trade. Similar, but shorter accounts are given of the seeds and essential oils of coriander (*Coriandrum sativum*) and cumin (*Cuminum cyminum*). Very brief notes are given on the essential oils of fennel (*Foeniculum vulgare* and of *Anethum graveolens*. [See also *H.A.*, 27: 2847, 3665.]

591. RANKOFF, G., TSCHOBANOFF, D., AND ZAGORSKI, G.
Untersuchungen über das Fette Öl aus Anissamen (*Pimpinella anisum* L.). **(Studies on the fatty oil of aniseed.)** [Russian summary 10 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 185-8, bibl. 11.

The comparatively high fatty oil content of aniseed, 23·5%, makes it possible to use the residue left after the distillation of essential oils for the extraction of fatty oil. The characteristics and composition of this oil make it suitable for high quality soap production.

592. VAN MARLE, G. S., AND LUIMES, B. J.
Arbeidsbesparing bij de teelt van witlofwortels. **(Saving labour in growing chicory roots.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 439-41, bibl. 1.

Row distances used commercially (30 cm. apart) were compared with spacing at 50 cm. combined with mechanical and chemical weed control. No differences in root quality or yield per acre were observed between the 2 cultural methods. During the whole growing season the labour saved in the wider-spaced crop averaged 19%, but during the period May–July the saving was 44%.

593. SCHRÖDER, H.
Zur Frage der Saatgutgewinnung bei Majoran (*Majorana hortensis* Moench) unter mitteldeutschen Verhältnissen. **(Marjoram seed production in central Germany.)**
Dtsch. Gartenb., 1957, **4**: 175-7, bibl. 8, illus.

Short-day treatment of marjoram plants did not induce earlier flowering, but delayed it. The low seed yield from central Germany as compared with that obtained in the south of France is attributed to lower rainfall and to a difference of 5·23° C. between the mean annual temperatures.—Karl-Marx-Univ., Leipzig.

Drug plants.

(*See also* 488, 649e, g, l.)

594. ANZALDO, F. E., MARAÑON, J., AND ANCHETA, S.
Screening of Philippine plants for steroidal sapogenins. I.
Philipp. J. Sci., 1956 (issued 1957), **85**: 305-14, bibl. 9.

Different parts of 83 local plants belonging to 7 families were screened for steroidal sapogenins as possible sources of cortisone. These provided 139 samples, of which 45 contained crude sapogenins and 19 steroidal sapogenins. The latter included bark samples of *Nerium indicum*, *Jatropha curcas* and *Macaranga tanarius* and tubers of *Dioscorea hispida*. No members of the Liliaceae, Amaryllidaceae and Malvaceae examined contained steroidal sapogenins.—Inst. Sci. Tech., Manila.

595. ZARUBINA, M. P.
Cultivation of medicinal plants in the Latvian S.S.R. [Russian.]
Tr. In-ta biol. AN LatvSSR, 1955, **3**: 85-140, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 10,405.

The present status of medicinal plant growing in Latvia is outlined. Trials on the acclimatization of *Polemonium coeruleum*, *Anisodus luridus* and *Erysimum canescens* are described. Methods of cultivation, means of propagation, frost resistance, optimum conditions, dates of harvest and the future development of the industry are discussed.

596. ANDRIES, M. C.
A study of the effects of certain mineral deficiencies on metabolism and alkaloid biogenesis in *Datura stramonium* L.
Diss. Abstr., 1957, **17**: 1314, being *Publ.* 20,367 of 109 pp.

Datura plants were grown in nutrient solutions deficient in Ca, K, N and P, and in rich soil in both field and greenhouse. Leaves from soil groups, compared with those from solution control groups, were found to synthesize about 6 times more tropane alkaloid, but almost 14% less total N. A Ca concentration of 80 p.p.m. (half that of the control solution) was associated with increasing alkaloid and amino acid biosynthesis, and decreasing total N and protein formation. At concentrations of 40 p.p.m. or 1·6 p.p.m. Ca alkaloids decreased, increases in amino acids continued and protein increase was apparent. K at 117 p.p.m. (half that of the control concentration) stimulated alkaloid formation by 34% and caused a significant decrease in total N and amino acid. At lower concentrations alkaloid, amino acid and protein biosynthesis were significantly reduced. N at one quarter of the control solution concentration caused a reduction in total N and protein. When P was at 0·31 p.p.m. (compared with 31 p.p.m. in the control solution) biosynthesis of alkaloids increased by more than 85%, while total N decreased.—Univ. Wash.

597. SCIUCHETTI, L. A.
A study of the effects of atropine and 2,4-dichlorophenoxyacetic acid on the growth and alkaloid formation in members of the Solanaceae.
Diss. Abstr., 1957, **17**: 1315, being *Publ.* 21,209 of 179 pp.

The effects of toxic concentrations of atropine and 2,4-D on plant growth and atropine accumulation were studied in *Datura stramonium* and tomato. Symptoms induced in both species are described. Significant

reases in the accumulation of alkaloids in the leaves
re induced in both species by atropine treatments.
aloids in *Datura* decreased after 2,4-D treatment,
not significantly. There were, however, consider-
e changes in the hyoscyamine/scopolamine ratio in
leaves of treated plants.—Univ. Wash.

8. Mortimer, P. I., and Wilkinson, S.
The occurrence of nicotine, anabasine and *iso*pelletierine in *Duboisia myoporoides.*
J. chem. Soc. Lond., 1957, pp. 3967-70, bibl. 10.

ves of the solanaceous shrub *Duboisia myoporoides*
used as a source of hyoscine and hyoscyamine.
wever, one consignment obtained in south Queens-
d contained comparatively little hyoscine and no
ectable hyoscyamine but considerable quantities of
otine, anabasine and *iso*pelletierine. The only other
wn natural source of *iso*pelletierine is the pome-
nate.—C.S.I.R.O., Canberra, Australia, and Well-
ne Res. Labs, Beckenham, England.

9. Tucakov, J.
The areas and the exploitation of the *Matricaria chamomilla* L. in Jugoslavia.
Maveg., 1957, **2**: 161-73, bibl. 4, illus.

peasant method of collecting wild *Matricaria* in
goslavia is described. The soil and climatic require-
nts of the plant and other ecological factors affecting
distribution and development are discussed.

París, R., and Letouzey, R.
Variations de teneur en alcaloides des écorces de *Pausinystalia yohimbe* (K. Schum.) ex Pierre (Rubiacées). **(Variations of alkaloid content in bark of *Pausinystalia yohimbe* (Rubiaceae).)**
J. Agric. trop. Bot. appl., 1957, **4**: 31-3.

tree 30 m. high the bark was richest in alkaloids
imbine and related substances) at 16–24 m. above
nd level, just below the first branch, and values
re slightly higher on the north than on the south side
he trunk. The bark of branches contained less than
of the trunk and very low values were found in
gs. The method of determination is described.
ac. Pharm., Paris.

01. Lisovskij, G. M.
Anomalous perianth structure in *Papaver somniferum.* [Russian.]
Bot. Žurnal, 1957, **42**: 1282-5, bibl. 5, illus.

observations at Ufa on 2 varieties of opium poppy
was found to produce flowers with 3, 5 and 6
als and the other flowers with 3 and 5. The former
nts were the larger and gave higher seed yields.

02. Gupta, B.
Anatomy of stems of *Rauwolfia serpentina,* Benth.
Sci. and Cult., 1957, **23**: 200-1, bibl. 6, illus.

nong the adulterants commonly found in consign-
nts of roots and rhizomes of *R. serpentina* are basal
rtions of stems, which contain very little alkaloid.
an aid to the identification of these stems their
croscopic and microscopic characteristics are des-
bed.—Bengal Immunity Res. Centre, Calcutta.

603. Siddiqui, S.
Isolation of a new hypotensive factor from the roots of *Rauwolfia serpentina,* Benth.
Chem. Ind. Lond., 1957, No. 38, pp. 1270-1, bibl. 6.

Roots of *R. serpentina* grown in East Pakistan yielded an alkaloid fraction, which was free from reserpine and other weaker bases and which accounted for about 40% of the total alkaloids. Tests have shown that this fraction, named serpajmaline, possesses much greater hypotensive activity than pure reserpine.—Cent. Labs, C.S.I.R., Karachi, Pakistan.

604. Šreter, A. I.
***Securinega suffruticosa,* a new medicinal plant indigenous to the U.S.S.R.** [Russian.]
Bot. Žurnal, 1957, **42**: 925-8, bibl. 13.

The history, distribution and synonyms of the shrub *S. suffruticosa* are discussed. From the leaves and soft green shoots a new alkaloid, named securinine was obtained, which is similar in action to strychnine. In clinical trials good results were obtained with securinine nitrate. The plant is being introduced into cultivation in the Moscow region.

605. Spencer, J. L., and Winters, H. F.
Compatibility, pollination and disease in relation to fruit yields of *Strophanthus intermedius* in Puerto Rico.
Bot. Gaz., 1957, **118**: 194-8, bibl. 9, illus.

Low fruit set was attributed to absence of the natural insect pollinator. This species of *Strophanthus* proved highly self-incompatible, but readily set fruit after artificial cross pollination. The fungus *Diplodia theobromae* caused a very high percentage of early fruit drop and *Colletotrichum gloeosporioides* attacked fruits approaching maturity.

Essential oils.

(*See also* 649d, 753z, 754k.)

606. Tucakov, J.
Contribution à l'étude de quelques plantes aromatiques et huiles essentielles yougoslaves. **(A contribution to the study of some aromatic plants and essential oils of Yugoslavia.)**
Maveg., 1957, **2**: 184-218, bibl. 17.

The culture of the following plants and their oil composition are discussed: *Salvia officinalis*, rosemary, mint, coriander, caraway, fennel, calamus (*Acorus calamus*), *Artemisia annua*, *Helichrysum angustifolium*, *Matricaria chamomilla* and juniper.

607. Barbier, E.
Le rendement en essence des lavandins et le butinage des abeilles. **(The yield of oil from lavender and foraging by bees.)**
Abeilles et Fleurs, 1956, No. 41, pp. 5-6, from abstr. in *Bee World*, 1957, **38**, No. 238/57.

Disquiet has been expressed by lavender growers, who believe that foraging by bees might be reducing their output of oil. The following facts are stated here. The oil is produced outside the calyx, whereas nectar accumulates within the corolla; honey from lavender contains no trace of the oil. However, lavender flowers worked by bees fade after 3 or 4 days, whereas those which are inaccessible to bees last for 12 days. A series of experiments at Nice and on the plateau of Riez in Germany were inconclusive because of the conditions, but they did not support the view that foraging by bees reduced the amount of oil produced. These experiments will be repeated during the current year.

608. Gupta, G. N., and Chandra, G.
Indian jasmine.
Econ. Bot., 1957, **11**: 178-81, illus.

Of 11 species of jasmine commonly grown in India the following are the principal sources of jasmine perfume: *Jasminum auriculatum*, *J. grandiflorum* and *J. sambac*. Their vernacular names are given with brief botanical notes and their culture, harvesting and yields, and the extraction and properties of their oils are outlined.—H.B. tech. Inst., Kanpur.

609. Ikeda, N., and Udo, S.
Studies of mint breeding. VIII. Studies on the productiveness and the properties of essential oils of interspecific hybrids in the genus *Mentha*. [Japanese, with English summary 1¼ pp.]
Sci. Rep. Fac. Agric. Okayama Univ., 1957, No. 10, pp. 43-50, bibl. 14.

A study was made of the individuals of the F_1 generation obtained by crossing *Mentha arvensis* var. *piperascens* (Japanese mint) with *M. spicata* and with *M.s.* var. *crispa*. All grew more vigorously and produced heavier plant yields than their parents, and they showed greater resistance to drought and to rust [*Puccinia menthae*]. Some strains contained nearly as high a percentage of essential oil as Japanese mint and therefore gave a better yield of oil per acre. Individuals derived from the cross with *crispa* were superior to those from the cross with *spicata*. Data are presented on the free menthol and unsaturated ketones in the oil.
J.R.L.

610. Green, R. J.
The vertical distribution of *Verticillium albo-atrum* in muck soils and its control.
From abstr. in *Phytopathology*, 1957, **47**: 522.

Studies of the vertical distribution of *V. albo-atrum* in muck soils revealed a pattern completely different from that found in mineral soils. Soil samples were taken in 6-in. increments to a depth of 36 in. and rooted cuttings of susceptible peppermint plants were used as indicator plants. The infection incidence from each sample was as follows: 0 to 6 in., 97·2%; 6 to 12 in., 90%; 12 to 18 in., 52%; 18 to 24 in., 0%; 24 to 30 in., 4·5%; 30 to 36 in., 0%. A soil-inversion technique was developed by which heavily contaminated topsoil can be buried to a depth of 14–18 in. A 36-in. mouldboard plough with a 16-in. brush plough mounted on the frame ahead of the large plough was used to turn the top 10–12 in. of soil into the previous furrow before the large plough inverted the remaining 18–24 in. of subsoil. In 1956 57·5% of the plants on a conventionally ploughed area had wilt, whereas only 4·0% of those on an area ploughed to a depth of 30–32 in. were wilted. Weed control, increased moisture retention, and reduced soil movement by wind are additional benefits derived from this practice.

611. Ross, J. P.
Studies on the chemotherapy and physiology of the *Verticillium* diseases of peppermint and chrysanthemum.
Diss. Abstr., 1957, **17**: 11, being *Publ.* 19,784 of 153 pp.

Absorption by cuttings of fungichromin or nabam gave the best control of *Verticillium albo-atrum* in peppermint and chrysanthemum. After treatment with fungichromin large increases in total amino acid N were detected in the cuttings. Infected chrysanthemum plants (40 days after inoculation) had a much higher content of proline than had healthy plants. The amino acid content in the stems of infected mint plants was 3 to 6 times higher than that of healthy plants. Pipecolic acid was detected in infected, but not in healthy, mint plants. [See also *H.A.*, 27: 2634.]—Cornell Univ.

612. Kolesnikov, P. A.
Quantitative determination of carbonyl compounds and of secondary and tertiary alcohols in small samples of plant materials. [Russian, with English summary 2 lines.]
Biohimija, 1957, **22**: 622-5, bibl. 4.

Colorimetric micro-methods are described for the quantitative determination of carbonyl compounds and of secondary and tertiary alcohols in small samples of the essential oil plants mint and coriander.

613. Reitsema, R. H., Cramer, F. J., and Fass, W. E.
Chromatographic measurement of variations in essential oils within a single plant.
J. agric. Food Chem., 1957, **5**: 779-80, bibl. 4.

A chromatographic study was made of old, medium and young leaves from peppermint and spearmint plants. It was found that the young leaves had a much higher percentage of oil per unit leaf area than the old leaves. Although the constituents of the oils remained qualitatively the same, the relative amounts of the constituents changed greatly with age. In peppermint oil there was a progression from a high pulegone content in the newest leaves to methone predominance in older leaves. In spearmint oil there was an increase in the amount of dihydrocarvone at the expense of carvone in the older leaves. In both oils the progression of change was generally from the unsaturated and ketonic to the saturated and alcoholic types of constituent. The practical applications of these findings are discussed.—A.M. Todd Co., Kalamazoo, Mich.

Fibres.

(*See also* 643, 995.)

614. Sladký, Z., and Spurný, M.
Řizeni procesu lignifikace lýkového sklerenchymu rostliny *Abutilon avicennae*. **(Control of the lignification of bast sclerenchyma in *Abutilon avicennae*.** [Russian summary 7 lines.]
Preslia, 1957, **29**: 38-43, bibl. 7, illus.

Variations in light intensity brought about by certain cultural practices affect the lignification of fibres in *A. avicennae* [China jute or Indian mallow]. Planting density was found to regulate the activity, not only of two basic dividing tissues, pericycle and cambium, also the amount of lignin formed. By choosing itable planting distance (20 × 20 cm.) it was possible educe the lignin content of the fibres and at the e time increase the total amount of fibre and rove the production of the better quality secondary es.—Inst. Plant Physiol., Natural History Fac., o.

5. SEALE, C. C., AND OTHERS.
Agronomy, breeding and pathology investigations of fiber crops.
A.R. Fla agric. Exp. Stats, 1955-56, pp. 227-8.

hest fibre yields from *Sansevieria trifasciata* were ained with a spacing of 14 in. between the rows with nts 7 in. apart in the rows; stands should be at least years old before the first harvest; regrowth after vest was most rapid after harvesting by cutting at h. above the ground or pulling fibre-length leaves. a hard fibre species experiment, henequen (*Agave rcroydes*) gave higher yields of better quality fibre n sisal or *Furcraea*.

6. TANGANYIKA SISAL GROWERS' ASSOCIATION (LOCK, G. W., AND OTHERS).
Annual Report of the Sisal Research Station, Mlingano, Ngomeni, for the year 1956, 1957, pp. 39, illus.

ne of the results from extensive field and laboratory ls include: *Bulbil nurseries:* in permanent bulbil eries the best results were obtained with a mixture ld and new sisal waste, supplemented by N; in lching trials sisal waste was better than a grass ch, and old sisal waste was significantly better n new; bulbils protected from weevil attack by irin have yielded 1·68 tons per acre more fibre n untreated suckers. *Plant spacing:* over a period 0 years results have shown that during the first le a close correlation exists between fibre yields and nt population, but this disappears during the second le owing to the effects of soil exhaustion. *Cultiva- n systems*: Sisal growth was initially retarded by rplanting with sorghum, but yields were not iously reduced; no significant differences in yield e been noted after land preparation by 3 methods, . hand weeding, strip ploughing, and complete ughing before planting. *Cutting methods:* yield luctions due to heavy cutting are due to the fibre ntent per leaf being lowered without a compensating rease in the number of leaves; heavy premature tting has yielded 9·7 tons/ha. compared with 17·7 ns/ha. from cutting at the usual stage. *Manurial als:* responses to Ca and to N have been observed, t P and K have not affected fibre yields; liming ulted in increased yields and larger leaves, but did t affect fibre percentage; nitrate of soda and calcium rate have given slightly better yields than sulphate ammonia or potassium nitrate; in several trials there ve been beneficial responses to N and sisal waste plications. *Rotational × manurial trials:* sisal grown er *Tephrosia candida* or *Glycine javanica* or a rotation op given N and P fertilizers has produced slightly tter yields than other methods of resting. *Plant eeding:* an F_2 hybrid of *Agave amaniensis* × *A. gustifolia* No. 11648 has shown promise in pre- ninary trials. *Herbicides:* dalapon and TCA have given promising weed control in nurseries, while CMV, MCPA and 2,4-D have proved more effective in the field. *Plant physiology:* B deficiency in sand culture plants was corrected by application of 0·66 p.p.m. per plant; leaf analysis has shown that sulphate of ammonia applications may reduce K, Ca and P contents, whereas ground limestone applications may increase leaf Ca but, after several cuttings, may reduce Mg and Mn; leaves showing symptoms of purple leaf tip roll were found to have lower contents of all the major mineral nutrients than had healthy leaves.

617. CZAJA, A. T.
Probleme der Massenvermehrung der Faser-Yucca-Pflanzen. **(Problems of mass propagation of *Yucca* fibre plants.)** [English summary ½ p.]
Maveg., 1957, **2**: 219-52, bibl. 17, illus.

The most usual method of propagating yuccas is with rhizome pieces, and pieces 7 to 10 cm. in length proved the most productive. Suckers 12 to 15 cm. long were also successfully used. Seed propagation was most successful when relatively large seeds were sown. The authors' observations show that seedlings flowered first at 2 to 4 years old.—Tech. Hochsch. Aachen.

Hops.

(*See also* 649f, j, p, s, v.)

618. WYE COLLEGE.
Annual Report Department of Hop Research for 1956, 1957, pp. 100, 5s.

In addition to the papers abstracted below, this report contains reviews of the year's work in the various sections of the Department. There is also a note on progressive *Verticillium* wilt of hops at Wye College and the establishment of quarantine gardens at Cambridge, and a history of a Golding hop garden at Wye during 1949–1956 with special reference to attack by downy mildew. A review on the chemistry of hop constituents is included. Among appendices there is a report on the Challenge Cups for new varieties, surveys of the 1956 hop season in the West-Midland and South-Eastern regions, and notes on recent publications and developments in hop research.

619. ASSOCIATION OF GROWERS OF THE NEW VARIETIES OF HOPS (A.G.N.V.H.).
Annual booklet 1957, 1957, pp. 40, price 4s. to non-members.

Included in this booklet are the following articles: A summary of the present position, by C. L. Jary and F. H. Beard, which describes the main characteristics of 11 new varieties; Soil requirements of some of the new varieties, by A. H. Burgess; Progress in research on hop diseases in 1956, by R. V. Harris (reprinted from *A.R. E. Malling Res. Stat. for 1956*); and Downy mildew (*Pseudoperonospora humuli*) and the new varieties of hops, by F. H. Beard.

620. DAVIS, E. L.
Typing hop samples by microscopic techniques.
Pap. 69th Anniv. Convent. Master Brewers Ass. Amer., Chicago, 1956, from abstr. in *A.R. Wye Coll., Dep. Hop Res., for 1956*, 1957, p. 100.

An examination of the botanical structure of some well-known hop varieties suggests that Saaz, Hallertau, Tettnang and Styrian hops are closely related and differ appreciably from Fuggles and Brewer's Gold.

621. Garbuzova, D. A.
Promising forms of vegetative hybrids of hops. [Russian.]
Agrobiologija, 1957, No. 2, pp. 70-4.

Since 1950 vegetative hybrids of hops have been produced at Žitomir by grafting apical cuttings, 3 cm. long, from female plants of several varieties onto basal internodes of female plants of the variety Clone No. 18. These were multiplied in the following spring by cuttings taken from the underground parts of the grafted stems. Many of the vegetative hybrids gave higher yields of cones with a higher percentage of aromatics than either parent. Seven hybrids, including two of Brewers Gold on Clone No. 18, are described. The investigation continues.

622. Derbyshire, D. M., and Dixon, E. M.
Notes on growing hops under glass during the winter of 1956-57.
A.R. Wye Coll., Dep. Hop Res., for 1956, 1957, pp. 73-6.

In order to obtain a supply of hop plants for mildew studies during the winter, various methods were tested of growing plants under glass with the aid of artificial light. Satisfactory growth was obtained from plants raised from seed and from lateral and strap cuttings.

623. Thompson, F. C.
The effect of spacing and height of wirework on the pattern of growth, yield and resin production of hops.
J. Inst. Brew., 1957, **63**: 399-407, bibl. 8, illus.

The mechanization of hop picking has necessitated research into methods of growing hops for the machine. Experience in the U.S.A. has indicated that both wider planting and higher wirework encourage the type of growth considered to be most suitable for machine picking, i.e., with the hops evenly distributed along the bine and an absence of large, tangled heads. The effect of three widths of spacing and three heights of wirework on the pattern of growth, yield and resin production has been studied at Wye on four varieties of hops [see also *H.A.*, 27: 648]. The effect of these treatments on pattern of growth has confirmed American experience. Over three seasons, wider planting has increased yield per plant, but this has not compensated for the reduction in plant population and yield per acre has fallen. The effect of higher wirework has been less marked but the trend has been for both yield per plant and yield per acre to rise. The influence of both height and spacing treatments on the percentage resins content of hop cones has been erratic and related to seasonal conditions. Resin yield per acre, however, is largely governed by crop yield, and has shown similar treatment responses. The conclusion reached is that growers should aim for higher wirework, rather than wider planting, in growing hops for the machine. [Author's abstract.]—Hop Res. Dep., Wye Coll., Kent.

624. Bujnickij, N. A.
Spacing and methods of training hop bines. [Russian.]
Tr. Vses. n-i. in-ta pivovar. prom., 1955, No. 5, pp. 93-104, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 10,378.

Pre- and post-war work at Žitomir Hop Research Station, Ukraine, is discussed. Eight years' trials (1945–1953) on the variety Clone No. 18 have shown that the most suitable spacings are $2\cdot1\times1$ m. with 2 bines on 1 support and $2\cdot1\times1\cdot6$ m. with 4 bines on 2 supports.

625. Thompson, F. C.
A note on a sand culture experiment on the nickel nutrition of the hop plant in relation to the incidence of nettlehead disease.
A.R. Wye Coll., Dep. Hop Res., for 1956, 1957, pp. 50-3, bibl. 4.

A sand culture experiment was carried out to investigate further the possibility that nettlehead disease of hops might be associated with high concentrations of nickel in the plant [see *H.A.*, 27: 1682]. Leaf analysis showed that applications of nickel sulphate in nutrient solution to Fuggle N hops increased the Ni content of the plants. This did not, however, result in the development of nettlehead, the main symptoms recorded being a chlorosis and scorch of the leaves typical of a mineral toxicity effect. A description is given of the standard nutrient solutions used at Wye for growing hops in sand culture.

626. Garbuzova, D. A.
Biology of flowering and the formation of cones in different varieties of hops. [Russian.]
Tr. Vses. n.-i. in-ta pivovar. prom., 1955, No. 5, pp. 3-20, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 10,377.

Studies conducted on 12 hop varieties at Žitomir Hop Research Station, Ukraine, during 1949 to 1953 showed that flower initiation in different varieties depends on their biological characteristics, cultural methods, and soil and meteorological conditions, with the temperature factor being decisive. Cone formation was positively affected by treating the inflorescence with 0·01% 2,4-D and with an aqueous extract of crushed hop leaves.

627. Beard, F. H.
The incidence of downy mildew *Pseudoperonospora humuli* in new seedling varieties of hops at Wye.
A.R. Wye Coll., Dep. Hop Res., for 1956, 1957, pp. 54-64, bibl. 4.

An account is given of the incidence of downy mildew at Wye during 1950–1956 in 77 new seedling varieties of hops. The various forms of the disease are described and appropriate control measures are outlined. The effect of summer rainfall is discussed, and it is concluded that this factor alone does not play a consistent part in the spread of the disease. A great range in varietal susceptibility has been observed. In the most resistant seedling, CC77, the incidence of diseased shoots (spikes) of all types has averaged only 4 per year per 100 hills. In the most susceptible seedling, Wye Field Golding, the corresponding number is 1,518. As in earlier work, no relationship has been found between susceptibility to the spike form the disease and to attack in the rootstock. The varieties recorded include derivatives of Wild Hop, nitoba, of New Mexican Wild Hop and Oregon ster. In each case the descendants have shown a le range of susceptibility to the spike form of the ease and no consistent trends have emerged. With ard to rootstock infection, derivatives of Wild Hop, nitoba, and Oregon Cluster were relatively sustible, while descendants of New Mexican Wild Hop e markedly resistant. [From author's summary.]

28. Horner, C. E., and Maier, C. R.
Antibiotics eliminate systemic downy mildew from hops.
Abstr. in *Phytopathology*, 1957, **47**: 525.

eptomycin sulfate (as Agristrep) and griseofulvin at h concentrations eliminated downy mildew from temically infected hop shoots. In one test, eptomycin spray at concentrations of 1,000, 3,000 1 5,000 p.p.m. transformed 16, 71 and 100%, pectively, of treated shoots into healthy vines. In other test with a greater volume of streptomycin ay at 0, 250, 500, 750, 1,000, 1,500, and 2,000 p.p.m., percentage of hills remaining infected was 91, 69, 34, 11, 9, and 3, respectively. Comparison of 0-p.p.m. streptomycin spray and dust on 800 hills h resulted in 86 and 0% control, respectively. plication of streptomycin sprays during rapid vegeve growth appeared to result in better control than lication at other times. Griseofulvin spray applied 500 or 1,000 p.p.m. to basal shoots eliminated her production of systemically infected shoots for remainder of the growing season. The following ng, the block of 300 hills previously treated with eofulvin had 20 infected shoots, whereas 300 unted hills had 141.

[illegible]. Darling, H. S., and Thompson, F. C.
The effect of machine picking on the resin content of hops—1956 crop.
A.R. Wye Coll., Dep. Hop Res., for 1956, 1957, pp. 44-9, bibl. 1.

urvey was carried out on 25 pairs of pocket samples m the 1956 crop, each pair consisting of one handked and one comparable machine-picked sample. e machine-picked samples had significantly less resin n the hand-picked ones, the average loss being 1·41% al soft resins. This was nearly twice as great as the ses recorded in 1954 and 1955 [see *H.A.*, 27: 654]. e leaf and stem content was significantly greater by % in the machine-picked samples. Physical examiion failed to reveal any visible differences between nd- and machine-picked samples other than in pect of the leaf and stem fractions. The data ggest that much of the resin loss associated with chine-picking was due to loss from whole and parently undamaged cones; increased dilution of sample with leaf and stem was also a contributory tor. [From authors' summary.]

30. Kotrlá-Hapalová, M.
Formation of bitter acids and analogous substances during the ripening and ageing of hops.
Brauwelt, 1957, pp. 745-8, and 856-65, from abstr. in *J. Inst. Brew.*, 1957, **63**: 442-3.

rapid method of determining the components of the hop bitter acids was applied for hop analysis during growth and also for the analysis of fresh and stored export-type hops. It was characteristic of Czechoslovakian hops that the formation of β-acids was more than half completed before the α-acids began to form. After a rapid increase in the α-acids both types of acid proceeded to form proportionately, so that the amount of β-acids exceeded the amount of α-acids at all stages of growth. However, this pattern was only partially developed in foreign hop varieties grown under identical conditions. The separation of both α- and β-acids into their separate analogues was influenced more by the region in which the hops were grown than by variety. At ripening the characteristic ratios were humulone : cohumulone : adhumulone about 80 : 10 : 10 and lupulone : colupulone : adlupulone about 60 : 20 : 20.

631. Goedkoop, W., and Hartong, B. D.
Conductometric hop analysis.
J. Inst. Brew., 1957, **63**: 386-90, bibl. 4.

In collaborative experiments involving 8 laboratories, the conductometric method for determination of α acids in hops, carried out by the technique described by Hartong, Jansen and Mendlik [*Int. Tijds. Brouw. Mout. 1956-57*, 15: 33], has been compared with the older methods already approved by the Analysis Committee of the European Brewery Convention. Using benzene as solvent, the conductometric method gives very satisfactory results in a working time of 15 min. [Authors' abstract.]—Zuid Holland Brew., The Hague, and Phoenix Brew., Amersfoort, Holland.

632. Templin, F. J.
Comparative tests regarding the effect of sulphuring on the bittering power of hops.
Amer. Brewer, 1955, **88**(5): 50, from abstr. in *A.R. Wye Coll., Dep. Hop Res., for 1956*, 1957, p. 100.

Early Cluster hops, dried without sulphur treatment, had a higher bittering value than similar sulphured samples. This result was not found with Late Cluster hops, however, and the author concludes that the effect of sulphuring on bittering power depends largely on the variety of hop used.

Insecticidal plants.

(*See also* 649o, 995.)

633. Levy, L. W.
El análisis del piretro y sus problemas. (**Analysis of pyrethrum and its problems.**) [English summary ¼ p.]
Cienc. Nat., 1957, **1**(1): 6-10, bibl. 17.

Flowers dried at a maximum of 40° C. contained 1·5–1·7% of total pyrethrins, but those dried rapidly at 95° C. (considerably above the supposedly "safe" temperature) contained as much as 2%. Methods of determining pyrethrins and cinerin in the flowers are discussed.

634. Theis, T., Freyre, R. H., and Kennard, W. C.
***Pellicularia filamentosa* on *Tephrosia vogelii* and *Cajanus indicus* in Puerto Rico.**
FAO Plant Prot. Bull., 1957, **5**: 159-60, bibl. 2, illus.

The leaves and young shoots of *Tephrosia vogelii*, under investigation as an insecticidal plant, were severely damaged by *P. filamentosa* during the rainy season of 1956. The disease was controlled by spraying twice weekly, using bordeaux and zineb alternatively, until the advent of dry weather.

Rubber plants.

635. Polhamus, L. G.
Rubber content of miscellaneous plants.
Production Res. Rep. U.S. Dep. Agric. **10**, 1957, pp. 25, bibl. 18.

In the search for new sources of crude rubber, analyses were carried out at Washington, D.C., over the period 1920–45 on 304 native and introduced species collected in the U.S.A. and on 54 species collected in other countries. These included members of 55 families, the best represented being the Compositae, Euphorbiaceae, Asclepiadaceae and Apocynaceae. For each plant the part sampled and the rubber content found are tabulated. None is considered to be of potential value as a rubber crop.

636. Tomaszewska, E., and Tomaszewski, M.
Gutaperka w liściach eukomii (*Eucommia ulmoides* Oliv.). **(Guttapercha in the leaves of *Eucommia ulmoides*.)** [English and Russian summaries 4 lines each.]
Arbor. Kórnickie, 1956, **2**: 235-7, bibl. 5.

Regular analyses of the leaves of *Eucommia ulmoides*, grown at Kórnik, Poland, showed that the gutta-percha content was highest in June (2·35% of leaves dried at 60° C.).

Seed oils.

(*See also* 649a-c, q.)

637. Markley, K. S.
Fat and oil resources and industry of Brazil.
Econ. Bot., 1957, **11**: 91-125, illus.

The total production of vegetable oils in Brazil in 1954 amounted to 242,516 metric tons, of which 131,097 tons were edible oils such as corn, cottonseed, peanut and sesame. Soap and tinplate oils, amounting to 40,256 tons, are derived mainly from the seeds and fruits of wild trees of which the babassu palm (*Orbignya speciosa*) is the most important. Others are murumuru (*Astrocaryum murumuru*) and tucum (*A. tucuma*) palms, *Virola surinamensis* and *V. sebifera* providing ucuhuba fat, and the 2 cultivated palms, the coconut and the oil palm. Among the drying and industrial oils, totalling 59,309 tons, castor oil is the most important, then linseed, oiticica (*Licania rigida*), tung (*Aleurites fordii*) and cashew (*Anacardium occidentale*). The group of miscellaneous oils, totalling 11,854 tons, includes cacao butter, the pulp oil of the patauá or batauá palm (*Jessenia bataua*), seed or kernel oils of the licurí (*Syagrus coronata*), pracaxí (*Pentaclethra filamentosa*) and curuá (*Orbignya* or *Attalea spectabilis*) palms and carapa oil from *Carapa guinensis*. The distribution of the plants and the preparation, uses and composition of the oils are discussed. [See also *H.A.*, 26:852.]

638. Subrahmanyam, V. V. R., and Achaya, K. T.
Lesser-known Indian vegetable fats. I. Oleic-rich fats.
J. Sci. Food Agric., 1957, **8**: 657-62, bibl. 21.

Five oleic-rich seed fats of Indian origin, viz. those derived from soapnut [*Sapindus trifoliatus*], papaya, nux vomica [*Strychnos nux vomica*] sweet almond and guava, have been analysed for component fatty acids by ester fractionation. All are potentially capable of collection at single locations. Possible uses are suggested. [Authors' abstract.]—Coun. sci. ind. Res., Hyderabad.

639. Subrahmanyam, V. V. R., and Achaya, K. T.
Lesser-known Indian vegetable fats. II. Linoleic-rich fats.
J. Sci. Food Agric., 1957, **8**: 662-8, bibl. 20.

Four linoleic-rich seed fats of Indian origin, viz. those from the sweet orange, coffee (arabica variety), coffee (robusta variety) and teak [*Tectona grandis*] have been analysed for component fatty acids by ester fractionation. The comparatively saturated nature of tropical seed fats over their temperate counterparts is again revealed. Family relationships between orders is discussed. [Authors' abstract.]—Coun. sci. ind. Res., Hyderabad.

640. (Vivacqua, A.)
Exploitation rationelle du babassu au Brésil. **(Rational exploitation of babassu palms in Brazil.)**
Oléagineux, 1957, **12**: 697-700, bibl. 2, illus.

A simple apparatus comprising mounted blades and a mallet has been designed for breaking the nuts to extract the seeds. A pilot factory at Pirapora (Minas Gerais) produces "coke", combustible gas, oils, tar and other distillation products from the shells and other waste, as well as babassu oil, without extraneous sources of fuel or power.

641. Parkey, W.
Cytoplasmic influence in the production of the pistillate sex expression in castorbeans.
Agron. J., 1957, **49**: 427-8.

The pistillate sex expression of the castorbean selection, herein described as line 1–4, is governed by the interaction of a *pistillate* cytoplasm in the presence of at least one dominant genetic factor. The pistillate line is maintained by backcrossing to the homozygous dominant male parent. Utilization of this phenomena will enable a more economical commercial production of hybrid castorbean seed as roguing in hybrid-increase fields is not required. [Authors' synopsis.]

642. Prokof'ev, A. A., and Godneva, M. T.
The role of the photosynthetic activity of the fruits of the oil poppy in seed development and oil accumulation. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 438-41, bibl. 9.

When dark covers were placed on oil-poppy seed capsules to exclude light from the second day after flowering they produced fewer seeds containing 3% less oil than capsules developed inside transparent covers. When the leaves were placed under dark vers, the capsules remaining uncovered, the number seeds was also reduced and their oil content declined om 49 to 21%.

43. Popoff, A., and Ivanov, S.
Untersuchungen über das Ramiesamenöl (*Boehmeria nivea* Hook. et Arnot.) II. Veränderungen im Öl beim Reifen und Lagern des Samens. **(Studies on the seed-oil of ramie. II. Changes in the oil during ripening and storage of seed.)** [Russian summary 8 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 221-4, bibl. 6.

he acid number of the oil was found to decrease uring seed ripening though it still remained fairly high 2·8) at maturity. During early stages of storage it ecreased and then rapidly increased. The iodine umber during ripening and early storage increased nd then slowly decreased. These changes are attributed to the activity of lipase and lipoxidase. [For rt I, see *H.A.*, 26: 1946.]

44. Popov, A., and Ivanov, S.
The seed oil of *Xanthium* L. [Russian, with German summary 8 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 229-32, bibl. 11.

he characteristics of the seed oils of *Xanthium strumarium*, *X. spinosum* and *X. italicum* are similar and re here tabulated. They do not contain linoleic acid nd are classed as semi-drying.

Tannin plants.

45. Günther, H.
Hirschkolbensumach (*Rhus typhina*)—eine Gerbstoffpflanze. **(Stag-horn sumac—a tannin plant.)**
Dtsch. Gartenb., 1957, **4**: 195-8, bibl. 1, illus.

he leaf tannin content of sumac has a genetical basis ut also varies with leaf form, season and climate. The aximum content is reached in late September and arly October. Seed and vegetative propagation is iscussed. Root cuttings about 10 cm. long rooted ost successfully when buried 3 cm. deep in the soil. When sumac plants were shaded during growth leaf ry weights and tannin contents were reduced. Drying f the leaf must be rapid, and a method is described y which the shredded leaves are subjected to a temperature of 500–600° C., so that in 1 to 1½ minutes the ater content is reduced from 60% to between 10 and %. Picking the leaves mechanically used 26% less bour, but the amount of leaf picked was 8% less than y hand.—Inst. Forstwiss. Tharandt, Berlin.

646. Webb, D. v. V., and Knoesen, J. G.
Wattle bagworm can be exterminated.
Fmg S. Afr., 1957, **33**(7): 42-4, illus.

A single aerial spray of endrin in diesoline at 2 oz. or oz. active ingredient per acre gave 99·5% mortality f wattle bagworm [*Acanthopsyche junodi*] after 7 days. A toxaphene-diesoline spray, at 3 lb. actual toxaphene er acre, gave 91·2% mortality after 7 days. A hand pray of endrin with diesoline at 1·8 oz. active ingredient gave 98·4% mortality after 7 days, while toxaphene (at 2·4 lb. actual toxaphene per acre) in diesoline gave 61·8% mortality after 7 days but 100% after 21 days. It is recommended that, on a large-scale, aerial sprays of 0·5% endrin-diesoline at 2–3 gal. per acre be used for control.

Sundry plants.

(*See also* 649h, i, k, m, n, t, u.)

647. Duggal, S. P., and Kartha, A. R. S.
Antioxidants for edible oils and fats from seeds of indigenous *Myristica* species.
Indian J. agric. Sci., 1956, **26**: 391-9, bibl. 17.

Comparative tests showed that a light coloured resin obtained from *Myristica malabarica* kernels was a more active antioxidant than butyl hydroxy-toluene. The phenolic substances present in *M. attenuata* and *M. canarica* showed only slight activity.—Indian agric. Res. Inst., New Delhi. J.R.L.

648. Tomaszewska, E., and Tomaszewski, M.
Skład chemiczny owoców cytrynowca chińskiego (*Schizandra chinensis* Baill.). **(The chemical composition of the fruits of *Schizandra chinensis*.)** [English and Russian summaries 7 lines each.]
Arbor. Kórnickie, 1956, **2**: 243-6, bibl. 10.

S. chinensis grows throughout the Far East and is widely used in Chinese medicine and also for flavouring. The physical and chemical characteristics of fruits picked at Kórnik, Poland, are given. Vitamin C averaged 31·5 mg./%.

Noted.

649.

a Akazawa, T., and Beevers, H.
Some chemical components of mitochondria and microsomes from germinating castor beans.
Biochem. J., 1957, **67**: 110-14, bibl. 18.

b Akazawa, T., and Beevers, H.
Mitochondria in the endosperm of the germinating castor bean: a developmental study.
Biochem. J., 1957, **67**: 115-18, bibl. 5.
Chemical changes.

c Beevers, H.
Incorporation of acetate-carbon into sucrose in castor bean tissues.
From abstr. in *Biochem. J.*, 1957, **66**(2): 23P-24P, bibl. 2.
Carbohydrate metabolism in cotyledon and endosperm tissue slices.

d Brown, E. G.
Cinnamon and cassia: sources, production and trade. Part II: Cassia.
Colon. Plant Anim. Prod., 1956 (issued 1957), **6**: 96-116, bibl. 51.
Culture, bark and oil from *Cinnamomum cassia*, etc.; a review. [Part I noted in *H.A.*, 27: 1701d.]

e CABO TORRES, J., AND OTHERS.
Normalización de algunos métodos de análisis de plantas medicinales. **(Standardization of some methods of analysis of medicinal plants.)**
Farmacognosia, 1957, **17**: 225-52, bibl. 19, illus.

f FIELD, K., AND LAWS, E. Q.
The determination of dimefox residues in hops.
Analyst, 1957, **82**: 667-71, bibl. 8.
Extraction, separation by chromatography and determination as phosphorus.

g FOLCH ANDRÉU, R.
Una droga que tiende a desaparecer del tesoro medicinal: el azafrán. (Estudio histórico.) **(A drug which is disappearing from the medical thesaurus: saffron. An historical study.)**
Farmacognosia, 1957, **17**: 145-224, bibl. 118.
Including culture and trade.

h GARDNER, C. A.
The manna wattle (*Acacia microbotrya* Benth).
J. Agric. W. Aust., 1957, **6**: 325-7, illus.
Description of the tree, the source of manna gum.

i GOLDFRANK, H.
Guar.
Chemurgic. Dig., 1957, **16**(2-3): 10, from abstr. in *Econ. Bot.*, 1957, **11**: 159.
Uses and sources of guar gum from seeds of *Cyamopsis tetragonaloba*.

j HAAS, G. J., AND FLEISCHMAN, A. I.
Determination of moisture in hops.
J. agric. Food Chem., 1957, **5**: 776-9, bibl. 19.*
Titration with Karl Fischer reagent compared favourably with oven drying and solvent distillation.

k HODGE, W. H.
Bamboos: their economic future in America.
Gdn J. N.Y. bot. Gdn, 1957, **7**: 124-8, 131, illus.
Their uses for paper, etc., now under investigation.

l KHAN, M.-u.-D.
Cultivation of isabghol (*Plantago ovata*).
Punjab Fruit J., 1957, **21**: 31.
Its seeds are used extensively in indigenous medicine.

m (KINMAN, M. L.)
Sesame . . . old crop with new life.
Agric. Res. Wash., 1957, **5**(12): 4-5, illus.
Improved non-shattering varieties facilitate harvesting.

n KURNAKOV, B. A.
Comparative estimation of the phytoncidal activity of *Paeonia anomala* growing in different environments. [Russian.]
Bot. Žurnal, 1957, **42**: 1285-6.
Variations in activity of root extracts against protozoa.

o LEVY, L. W., AND MOLINA, H.
A hydrolytic method for the estimation of pyrethrins II in pyrethrum flowers.
Pyreth. Post, 1957, **4**(2): 22-4, bibl. 13.
A rapid method developed at the Escuela polytéc. nac., Quito, Ecuador.

p MAIER, C. R., AND HORNER, C. E.
Absorption and translocation of streptomycin by hops.
From abstr. in *Phytopathology*, 1957, **47**: 528.
Both sulphate and nitrate readily absorbed and translocated.

q PATHAK, S. P., AND OJHA, V. N.
The component glycerides of nutmeg butter *Myristica fragrans*).
J. Sci. Food Agric., 1957, **8**: 537-40, bibl. 10.

r RAO, U. N., AND MUTHUSWAMY, S.
A note on successful cultivation of vanilla (*Vanilla planifolia* And) at Coimbatore.
South Indian Hort., 1956, **4**: 128-9.
First record of vanilla fruiting in an area with only 24 in. annual rainfall.

s SALAC, V.
Significance of hop aroma.
Brewers Dig., May 1957, pp. 52-4, 56, from abstr. in *J. Inst. Brew.*, 1957, **63**: 443.
Existing methods of identifying hop oils are not sufficiently sensitive to distinguish finer differences in aroma.

t TIBERIO, M.
Estrazione, separazione cromatografica e determinazione quantitativa colorimetrica della galegina. **(Extraction, chromatographic separation and quantitative colorimetric determination of galegine.)** [English summary ½ p.]
Ann. Sper. agrar., 1957, **11**: 1045-54, bibl. 18.
From various organs of *Galega officinalis*.

u WHITE, E. P.
Alkaloids of the Leguminosae. Part XXIV: Filter-paper disc chromatography of leguminous alkaloids and other bases. Part XXV: Alkaloids of *Genista monosperma* Lam. Part XXVI: Examination of further legumes, mainly *Lupinus* and *Acacia* species for alkaloids.
N.Z. J. Sci. Tech. Sect. B, 1957, **38**: 707-12, bibl. 8, 712-18, bibl. 14, and 718-25, bibl. 12.
For earlier work see *H.A.*, 24: 4068w.

v ZATTLER, F.
The wilt disease of hops.
Hopfen Rundschau, 1957, **8**(1): 6, from abstr. in *A.R. Wye Coll., Dep. Hop Res., for 1956*, 1957, p. 99.
Attributed to the combined effects of weak fungal parasites and nematodes.

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* Reprinted *Wallerstein Lab. Commun.*, 1957, **20**: 377-83.

FLORICULTURE.

General.

See also 14, 17-20, 22, 24-26, 38, 40, 44, 45, 50, 57, Bk, 72, 356-358, 753a, h, m, x, 754d, i, j, 971, 974, 975, 987, 992, 1000, 1005, 1015b, i, q.)

650. Pico, J. A.
Antecedentes sobra la historia de los jardines. **(The history of gardens from early times.)**
Misc. Univ. nac. Tucumán, Fac. Agron. **5**, 1956, pp. 49, bibl. 16, illus.

The author describes the ancient gardens of Egypt, Babylon, China, Japan, Greece, Rome, Persia and Mexico, the medieval gardens of Spain, the renaissance gardens of Italy and France, and contemporary gardens.

651. Kubo, T.
A compilation of the "Sakuteiki" for Japanese gardens.
Bull. Univ. Osaka Pref., Ser. B, 1956, **6**: 17-31, illus.

This paper is a translation and rearrangement of the contents of the original "Sakuteiki" on garden design written in about 1040 A.D., with some additional pictures and notes by the author. Most later work on the planning of Japanese gardens has developed from these fundamental ideas on the use of streams and lakes and on the placing of rocks, particularly in relation to the house. J.R.L.

652. Lipp, L. F., Nelson, P. K., and Umbreit, C. S. (Editors).
Handbook on propagation.
Plants and Gdns, 1957, Vol. **13**, No. 2, pp. 81-159, bibls, illus. (available as a separate from the Brooklyn Botanic Garden, N.Y., price $1.00).

An excellent booklet on features of plant propagation of importance to gardeners, composed of concise contributions from a score of experts. There are over a hundred illustrations each demonstrating some feature of interest. Whilst describing modern techniques, including the use of hormones, mist and plastic film, the old tricks are not forgotten. We begin with a few words on the ancient history of the art, and end with a select list of nineteen books for further study. In between there are articles on softwood and hardwood cuttings, grafting and budding, rootstocks, seedage, layering and division, besides other matters. One of a series appearing quarterly, this number provides in simple language and pictures just the information sought by the amateur propagator. R.J.G.

653. Riehl, G.
Der Einfluss verschiedener Umweltbedingungen in der gärtnerischen Stecklingsvermehrung bei Unterbewässerung. **(The effect of various environmental conditions on the propagation of ornamental plants by cuttings with the aid of subirrigation.)** [Russian and English summaries 17 lines each.]
Arch. Gartenb., 1956, **4**: 433-522, bibl. 216, illus.

An extensive study was made of the influence of environmental factors on the rooting of cuttings of various ornamentals. The following are among the more important conclusions reached: (1) Of all the factors considered the moisture content of the medium was of outstanding importance, but no definite rules can usefully be given, as the optimum varied with plant and conditions. When moisture was rather too high cuttings near the periphery of the pot did best. When moisture was too high thick cuttings proved more successful than thin ones and *vice versa*. For the purpose of propagation sub-irrigation was shown to be greatly superior to other methods of watering. (2) Although pH did not have a great influence on the rooting of fuchsia, carnation and chrysanthemum cuttings, extreme values should be avoided. An acid reaction had a deleterious effect on the growth of rooted carnation plants. (3) In order to determine the rate of rooting in a given batch of cuttings, individual cuttings had to be inspected at regular intervals. Provided reasonable precautions were taken, lifting the cuttings for short periods did not affect their rooting ability. (4) Herbaceous cuttings remained turgid in spite of rapid callus formation. (5) The effect of light on rooting was studied in some detail; lack of light generally caused injury to the green organs. (6) The breaking of cuttings from the plant had no deleterious effect on rooting as compared with cutting by knife, nor had the type of cut (straight, slanting, etc.) any influence. (7) With *Peperomia incana* leaf cuttings were more successful than stem cuttings. With gloxinia and kalanchoë whole leaves formed roots more quickly than halved leaves. With gloxinia and saintpaulia whole leaves without a petiole developed roots more rapidly than whole leaves with a 2-cm. petiole. Generally, tip cuttings rooted better than leaf cuttings. With carnations trimming the heel did not improve root formation. (8) A reduction in the leaf area of a cutting decreased rooting at all moisture levels, the bad effect of this not being offset by the restriction of transpiration. (9) The presence of a flower bud had an adverse effect on rooting, which increased as the bud developed. Pinching out the bud eliminated this effect. (10) When placed in water tip cuttings were less subject to rotting or insolation injury than when placed in other media. As, however, no root balls are formed in the water it is advisable to transfer such cuttings soon after rooting starts to a rich soil medium. (11) Shading cuttings proved useful only as temporary protection against sun burn. High transpiration losses should be made good by watering. (12) Growing chrysanthemum cuttings in darkness for 4 days, as is the custom, did not have any advantage when moisture conditions were optimal, and the practice was injurious when the moisture content was high. (13) The time of day at which cuttings were taken had no effect on rooting. (14) Tip cuttings placed in water responded better to a mean temperature of 25° C. than to lower temperatures. (15) In tests with *Chrysanthemum indicum* cuttings the application of the growth substance preparation P604 [active agent not stated] had a much better effect at a mean temperature of 23° C. and when the moisture content of the medium was sub-optimal than when the temperature was lower and the moisture content rather higher.—Inst. Zierpflanzenb. Humboldt-Univ., Berlin.

654. Riehl, G.
Stecklingsvermehrung mit Unterbewässerung. **(Propagation by cuttings with sub-irrigation.)**
Gartenwelt, 1957, **57**: 259-60, bibl. 1, illus.

The advantages of sub-irrigation are discussed and a method described. Rooting of fuchsia and salvia cuttings was more rapid and profuse with sub-irrigation than with overhead watering. Rooting of pink cuttings was closely related to the moisture content of the rooting medium.—Inst. Zierpflanzenb., Humboldt-Univ., Berlin.

655. Dorsman, C.
Stekken onder sproeidoppen. **(Mist propagation of cuttings.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 675-84, bibl. 3, illus.

Experience of mist propagation of cuttings at Boskoop is described. The type of nozzle used was the Florida 550A, at 30 cm. above the bench; an intermittent spray controlled by an electronic leaf gave the best results. Rooting with almost all ornamentals and conifers was much better in mist than under double glass, but rhododendrons have given disappointing results without soil heating. Growth substance treatment gave improved rooting, especially in unfavourable climatic conditions. A sand/peat mixture was more satisfactory than sand alone, and the addition of plastic flock improved the medium further. For mist propagation the same degree of ripeness in cuttings was generally needed as for rooting under glass, but with *Pernettya mucronata* and *Berberis linearifolia* "Orange King" softer cuttings gave better results under mist.—Rijkstuinbouwconsulentsch., Boskoop.

656. Egberts, H.
De invloed van de zuurgraad (pH) van de grond op de ontwikkeling van verschillende boomkwekerijgewassen. **(The effect of soil pH on the growth of various woody ornamentals.)**
Jaarb. Proefst. Boomkw. Boskoop 1956, pp. 68-9.

Trials on peat soil showed that the optimum pH for growth of *Daphne mezereum* was 5·4, although the range 4·6–5·4 was satisfactory. Growth of *Helleborus niger* was best at pH 5·9. A pH between 4·6 and 5·9 was favourable to *Juniperus sinensis plumosa*.

657. Baumann, H.
Kunstharzschaumstoff für die erdelose Pflanzenkultur. **(Artificial resin foam material for soilless culture of plants.)**
Gartenwelt, 1957, **57**: 273-4, illus.

Methods of using artificial resin foam materials in soilless culture are described. Pot plants which have been grown successfully in the substrate include cyclamen, peperomia, sanseveria, sparmannia and begonia. Two advantages claimed for the material are that crumbs of various sizes may be used, which provides textures similar to soil, and that seeds may be sown directly in the medium.

658. DeWerth, A. F., and Jaska, R. C.
Greenhouse cooling.
[*Publ.*] *Texas agric. Exp. Stat.* **MP-163**, 1956, pp. 10, illus.

In experiments started at College Station in 1949 the wet-pad exhaust fan system proved the most effective method of cooling greenhouses under Texas conditions. Its use was very successful with many flower crops, in that it reduced labour and water requirements, extended the periods of production and improved both quality and yield.

659. DeBoer, R. H.
Effect of night lights on plant growth being studied.
N.J. Agric., 1957, **39**(3): 3-5, illus.

A study is being made of the physiological effects of garden lighting with fluorescent or incandescent flood lights during the night on ornamental plants, mainly shrubs. Preliminary results have shown that most of the species tested made considerably more growth with the supplemental light, growth being continued later in the season. They also suffered more frost damage.

660. Blassinsky, —., and Baumgärtel, H.
Ergebnisse von Belichtungsversuchen. **(Results of studies in illumination.)**
Gartenwelt, 1957, **57**: 256-7, illus.

Four types of lamp (mercury-vapour and fluorescent) which have been used to give supplementary light to hydrangeas, gloxinias, saintpaulias and Lorraine begonias are discussed. Additional lighting given to hydrangeas from December to February resulted in earlier flowering, the effect varying according to variety. When supplementary lighting was given at night, the optimum period appeared to be 8 hours per night for 6–7 weeks. Extra lighting inhibited flower formation in begonia cuttings and encouraged better rooting. Fluorescent lamps were used for night illumination of gloxinia seedlings, and healthier, larger plants were produced.

661. Virgin, H. I.
Stomatal transpiration of some variegated plants and of chlorophyll-deficient mutants of barley.
Physiol. Plant., 1957, **10**: 170-86, bibl. 39.

The variegated plants studied were *Ficus rubiginosa*, *Bougainvillea glabra*, *Abutilon hybridum* and *Pelargonium zonale*. The so-called non-chlorophyllous parts of these plants were found to contain small amounts of chlorophyll. Light-induced stomatal transpiration was much less in non-chlorophyllous leaves than in normal leaves of the same size. A light response was always obtained when chlorophyll was present. From these results and those obtained on normal and mutant barley plants, it is concluded that chlorophyll pigments are a prerequisite for the stomata to respond to light with opening movements and that photosynthesis plays a part in the stomatal mechanism.—Bot. Lab., Lund.

662. Davidson, J. H.
Rapid vaporization of methyl bromide in treatment of seedbeds, for turf renovation and other uses.
Down to Earth, 1957, **13**(2): 6-9, bibl. 3, illus.

The procedure for soil fumigation by applying methyl bromide under a gas-tight cover is described. Effective pest and weed control has been obtained with 6 hours exposure when air and soil temperatures were as low as 0° F. Concentrations of up to 12 lb. methyl bromide per 1,000 cu. ft. of air have been obtained under the covers with penetration of 6 inches. Preliminary trials indicate that nematode control is satisfactory.—Dow Chem. Co.

663. Miller, H. N.
Control of powdery mildew on ornamentals with antibiotics.
A.R. Fla agric. Exp. Stats, 1955-56, p. 118.

A single application of Anisomycin at 200 p.p.m. to sweet pea plants completely controlled powdery mildew, but caused severe flecking of the leaves. Griseofulvin at 100 p.p.m. gave good control of powdery mildew on crape myrtle [*Lagerstroemia indica*], and Anisomycin at 100 p.p.m. gave 85–90% control of the disease on roses.

664. Aarts, J. F. T.
De ontwikkeling en houdbaarheid van afgesneden bloemen. **(The development and keeping qualities of cut flowers.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 690-701 (bibl. 30 obtainable from author), illus.

Bacterial growth in flower water may best be prevented by adding 0·003% silver nitrate plus 0·1% calcium nitrate. Addition of growth substances, growth inhibitors or respiratory inhibitors was not effective in preventing chemical disintegration of cells, and favourable results were only obtained by the addition of sugar at an early stage. The optimum concentrations, which vary according to species, are tabulated. NAA and IAA prevented the shedding of lupin flowers and of catkins of *Alnus glutinosa* and *Corylus avellana*; spraying or dipping was more effective than normal absorption through the cut end. Dropping of *Alnus* catkins could be delayed by vacuum infiltration of water alone. Petal fall in tulips, roses and sweet peas, and flower drop in *Ribes sanguineum* and *Laburnum anagyroides* were prevented by the addition of 4% sugar. Sugar given during cool storage to dahlias and freesias had a favourable effect on their later development. For forcing cut lilac branches, boric acid as well as sugar and the bactericide addition to the water had beneficial effects.—Lab. Tuinbouwpl., Wageningen.

665. Miller, R.
Ohio tests compare films used for prepackaging cut flowers.
Flor. Exch., 1957, **129**(2): 7.

Small chrysanthemum plants in pots and cut flowers of chrysanthemums, carnations and roses were stored for varying periods in several types of packaging films. Potted and cut chrysanthemums and carnations lasted longer after storage in bags of bakelite, cellothene, and mylar than in cellophane bags. There were no differences in rose quality after storage in the different bags. Carnations stored better in bags closed by stapling than in sealed bags.

666. Peters, C. W.
Selling Hawaiian floral products on the Mainland. A market appraisal—Part 1.
Agric. Econ. Bull. Hawaii agric. Exp. Stat. **10**, 1956, pp. 44, bibl. 4, illus.

Among Hawaiian exports, floral products—cut flowers, orchids, foliage and speciality items such as leis—are only exceeded in value by sugar, pineapples and coffee. There is also a substantial local trade. In 1950 and 1951 studies on the marketing of floral products in the U.S.A. suggested that the prospects for expanding the export trade were good. However, the expected expansion did not materialize, and a new investigation was undertaken in 1955 to determine the current status of the industry and to evaluate trade reactions on the Mainland to Hawaiian floral products. The results of this investigation are reported in this bulletin together with suggestions for improving the export trade.

Annuals and herbaceous plants.

(*See also* 30, 611, 721, 753b, l, r, w, 754a, b, h, l, 976.)

667. Lindstrom, R. S., Wittwer, S. H., and Bukovac, M. J.
Gibberellin and higher plants. IV. Flowering responses of some flower crops.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 673-81, bibl. 5, illus.

GB (20 micrograms applied to stem apices or a foliar spray of 10–100 p.p.m.) hastened flowering by 10 days to 4 weeks in stocks, petunias, larkspurs, English daisies, China asters and gerberas when grown in the greenhouse in autumn and winter. No harmful effects were seen. Higher concentrations proved harmful except in foxglove, a cold-needing biennial. GB-treated pansy and forget-me-not plants also flowered early, whereas controls remained vegetative.

668. de Groote, R.
Résultats d'un essai d'orientation de la pulvérisation d'une solution du sel potassique de l'acide gibberellique sur quelques plantes ornementales. **(Results of preliminary tests on spraying some ornamentals with the potassium salt of gibberellic acid.)**
Bull. hort. Liège, 1957, **12**: 279-80, illus.

Several ornamentals, which germinate and develop rapidly, were sprayed with gibberellic acid at 0·0001% 2 weeks after sowing. Subsequent stem elongation was marked with *Arabis alpina*, *Digitalis gloxinioides*, *Viola cornuta*, *Veronica spicata* and *Gypsophila paniculata*, but 14 other species did not respond.

669. Sagawa, Y., and Mehlquist, G. A. L.
The mechanism responsible for some X-ray induced changes in flower color of the carnation, *Dianthus caryophyllus*.
Amer. J. Bot., 1957, **44**: 397-403, bibl. 13, illus.

The effect of X-rays on flower color was studied in 3 carnation clones, William Sim (red) and two of its spontaneously-derived color variants, Pink Sim and White Sim. Rooted cuttings of the 3 clones were irradiated with a single acute dose of either 2,500 r or 5,000 r of X-rays. Flower color was recorded when the plants came into bloom some 8 months later. An extremely high number of changes (47–91%) from pink to red and white to red was observed. A much lower frequency of change (0–4%) from red to white or to pink was noted. Breeding tests had previously shown Pink Sim and White Sim to be periclinal chimeras with the mutant condition confined to the outer layers of cells and not deep enough to be included in the gamete-forming tissue. An anatomical study of the stem apex at various intervals after irradiation revealed that the radiation caused destruction of the outer layers of the stem apex which was followed by regeneration of a new apex from the more deep-seated cells. The newly reconstituted apex was thus not periclinally chimeric and was capable of producing red flowers owing to its origin from endogenous genetically red tissue. The observed "reversion" in flower color was, therefore, the result of a radiation-induced morphological alteration of the shoot apex and not due to mutation. [From authors' summary. See also *H.A.*, 27: 3728.]—Brookhaven nat. Lab., Upton, N.Y., and Univ. Conn., Storrs.

670. Nelson, K. S., and Kiplinger, D. C.
Carnation crop control.
Res. Bull. Ohio agric. Exp. Stat. **786**, 1957, pp. 51, bibl. 11, illus.

Several aspects of carnation crop control, studied from 1948 to 1955, are described, and the results and their application to commercial carnation forcing in Ohio are discussed. The studies suggest that rate of flower production is affected by light intensity, temperature, the method of pinching and other factors not yet determined. The time elapsing between pinching and the peak of crop production varied from 3 months when it was done in the spring to 8 months when done in the autumn; thus November–May flower production resulted primarily from stems pinched during July–September. It was also found that flower initiation occurred earlier in rooted cuttings stored at 31° F. than in those that were not cold-stored or were cold-stored before rooting. For storage a period of 1–2 months proved better than 3 months. At the time of floral initiation the majority of the stems originating from the upper portion of the plant had 16 to 19 internodes, but stems arising from the basal portion of the plant had more. Shoots that initiated flower buds early had fewer internodes than shoots from a similarly treated plant that initiated flower buds later. When the terminal flower was ready for cutting the sublateral shoots formed at the first 7 to 8 nodes had well-developed flower buds on short, thin stems; at the next node below this the lateral shoot formed was vegetative, but at a later date produced a flower on a stem consisting of 17 internodes. The time relationships for crop production were found to be the same for "single-pinch" or "multiple-pinch" culture. J.R.L.

671. (Holley, W. D.)
Greenhouse cooling incites carnations.
Colo. Flower Grs' Ass. Bull., summarized in *Flor. Exch.*, 1957, **129**(8): 13.

The time between planting and pinching for carnations grown in cooled greenhouses was about 2 weeks less than for plants grown in uncooled houses. The time from pinching to mid-point of the first crop was approximately the same for both cultures. Cooling reduced the time between the first and second crops by 4 to 5 weeks.

672. (Schmidt, R. G., and Holley, W. D.)
Warmer nights bring better colour.
Colo. Flower Grs' Ass. Bull., summarized in *Grower*, 1957, **48**: 794-5.

Red Gayety carnations were grown at night temperatures of 48°, 50°, 52° and 54° F. during the winter in Colorado. Colour became more intense and quality improved with each rise in temperature, but at 54° F. internodes were significantly shorter than at 48° F.

673. Waterschoot, H. F.
Effects of temperature and daylength on flowering in *Dianthus barbatus* L.
Proc. kon. ned. Akad. Wetensch. Ser. C, 1957, **60**: 318-23, bibl. 7.

Dianthus barbatus, when it has reached a minimum size after 12 weeks, requires a period of low temperature in order to flower. The effect of low temperature is indirect, the actual formation of primordia proceeding afterwards at higher temperatures. An effect of long days in promoting and accelerating flowering is very slight and only becomes apparent when the plants have been subjected to low temperatures for a period long enough to induce flowering.—Lab. Tuinbouwpl., Wageningen.

674. Cardus, J., and Aguilá, J. F.
Fertilización del *Dianthus caryophyllus* en cultivos industriales. 1. Necesidades del potasio en las variedades Ambra, Joly y Duca. (**Fertilizing *Dianthus caryophyllus* in commercial cultivation. 1. Potassium requirements of the varieties Ambra, Joly and Duca.** [English summary 6 lines.]
An. Edafol. Fisiol. veg., 1957, **16**: 637-49, bibl. 13.

The carnation varieties Ambra, Duca and Joly showed equally high responses in flower production when the K application was raised from 2,400 to 3,600 kg. K_2O per ha. With a further increase to 5,256 kg. Ambra still showed a marked response, Duca a moderate response and Joly no further increase. Ambra was the most, and Joly the least, prolific throughout. Flower quality was improved greatly by the first K application and there was a further slight improvement with the second K increment. The same was true of frost resistance, which was naturally low in Ambra.

675. Baker, R.
The height of invasion of two pathogens in carnation stems.
Abstr. in *Phytopathology*, 1957, **47**: 516.

During attempts to obtain pathogen-free carnations by means of the cultured-cutting technique, the wilt pathogen, *Fusarium oxysporum* f. *dianthi*, was occasionally isolated. The stem rot pathogen, *F. roseum* f. *cerealis*, was isolated only once during a 4-year period. To ascertain the extent of invasion of these pathogens in stems of carnation, stem segments from the lower 18 in. of stems of plants with symptoms of *Fusarium* wilt and *Fusarium* stem rot were cultured. *F. oxysporum* frequently was found in stems 18 in. above the base. *F. roseum* was occasionally isolated 6–8 in. above the base, but usually no higher than 4 in. In a controlled experiment plants were inoculated with the 2 pathogens and at intervals over a 21-month period plantings were made from test plants at points up to 24 in. above the base of the stem. *F. oxysporum* was found at 18 in. in 1 instance but usually not more than 4–6 in. above the base of the stem. The maximum height at which *F. roseum* was isolated was 2 in. Cuttings taken from "mother" plants infected with *F. roseum* were cut into 2-mm. sections, and these were cultured. The organism was not recovered from the cuttings. These results indicated that *F. roseum*, in contrast to *F. oxysporum*, is not likely to be carried in carnation cuttings.

676. (PETERSEN, J. L.)
A new friend for carnations?
Colo. Flower Grs' Ass. Bull., summarized in *Grower*, 1957, **48**: 848.

Among new materials tested for control of fusarium stem rot (chiefly *Fusarium roseum* f. *cerealis*) in mother-blocks of carnations are the omadines, of which the Mn salt of omadine OM 1564 was the most promising. OM 1564 was the most successful in controlling fusarium stem rot after 3 successive foliar applications, and the rooting of cuttings taken after treatment was improved when 8 applications had been made. There were indications that the compound is 50% less effective after 7 days' exposure to sunlight.

677. BESTAGNO, G., AND SANTOCCHIA, A.
Prove di disinfestazione con bromuro di metile sotto vuoto, in apparecchiatura di laboratorio, di fiori di garofano attaccati da *Cacoecia* (=*Tortrix*) *pronubana* Hub. **(Disinfestation experiments with methyl bromide *in vacuo* under laboratory conditions of carnation flowers attacked by *Cacoecia* (= *Tortrix*) *pronubana*.)** [English summary ¼ p.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, *Suppl.* pp. xlvii–lxxv, bibl. 16, illus.

Good results were obtained with cut flowers of winter-produced carnations by vacuum fumigation at 18–20° C. with concentrated methyl bromide used at 40 g. per cu. m. for 1½ hours or at 30 g. per cu. m. for 2 hours. [See also *H.A.*, 27: 1717.]—Osserv. Mal. Piante, Sanremo.

678. MINISTRY OF AGRICULTURE, LONDON.
Chrysanthemums.
Bull. Minist. Agric. Lond. **92**, 5th edition, 1957, pp. 56, illus., 4s.

The principal changes made since the last edition of this bulletin in 1954 [*H.A.*, 25: 816] are the addition of sections on cultivation in mobile houses and on automatic watering, and the complete revision of the sections on cultivation from late-struck cuttings and on virus diseases, there being 2 new illustrations showing virus symptoms. Lists of varieties and information on pest and disease control have been brought up to date. The list of stopping dates has been omitted.

679. DOVASTON, H. F.
Report of the 1956 trials of early flowering chrysanthemum varieties in Scotland.
Res. Bull. W. Scot. agric. Coll. **19**, 1957, pp. 10.

Data, similar to those recorded for 1955 [*H.A.*, 27: 686], are presented on the performance of 92 varieties grown in the open and 9 grown under Dutch lights at Auchincruive. There were marked differences in the Aug.–Oct. weather between the two years and these were reflected in the behaviour of the varieties.

680. MASON, D. T.
Chrysanthemum. 1. A classification of some mid-season and late-flowering varieties according to their vernalization requirement and to their rapidity of bud formation in long days.
Tech. Bull. Univ. Reading, Dep. Hort. **1**, 1957, pp. 8, bibl. 2.

Forty-five varieties were considered. "Fred Shoesmith" proved outstandingly reliable in late-struck methods and lighting schedules. It has no vernalization requirement and under long days budding is delayed for 2½ months. A vernalization requirement may not, however, preclude the use of a variety, since cuttings taken from the stems of vernalized stock plants are themselves fully vernalized and require no further chilling. There is, however, some danger that when high temperatures and low light conditions occur together during the winter plants may become devernalized and remain vegetative.

681. JANK, H.
Experimentelle Mutationsauslösung durch Röntgenstrahlen bei *Chrysanthemum indicum*. **(Experimental induction of mutations by X-rays in *Chrysanthemum indicum*.)**
Züchter, 1957, **27**: 223-31, bibl. 3, illus.
Zur Anwendung der experimentellen Mutationsauslösung im Zierpflanzenbau. **(The use of experimental induction of mutations in ornamental horticulture.)**
Dtsch. Gartenb., 1957, **4**: 210-12.

Treatment of chrysanthemums with X-rays induced many changes in flower colour, which were considered to be chimaeral. The most effective dosages were 1,000 r and 1,500 r.

In the second article the author discusses the value and aims of artificial induction of mutations for experimental horticulture. The results given in the first article are repeated briefly.

682. MAATSCH, R., AND HANTELMANN, R.
Gesteuerte Chrysanthemenkultur III. **(Controlled chrysanthemum growing.)**
Gartenwelt, 1957, **57**: 239-40.

Batches of cuttings of 25 chrysanthemum varieties were taken on 3 to 5 dates ranging from June 5 to Aug. 25 and the effects recorded as regards time of flowering and flower quality.

683. TSUKAMOTO, Y., AND HARADA, T.
Studies on the delaying of chrysanthemum flowering by growth substance sprays. (2.) [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1957, **26**: 54-8, bibl. 7.

Sprays containing 5, 10, 50, 100 or 500 p.p.m. NAA wree applied to Okayama Heiwa chrysanthemum plants during August and September before flower bud differentiation had begun. Sprays containing 50 or more p.p.m. NAA successfully delayed flowering, but with concentrations above 100 p.p.m. growth was inhibited. When a concentration of 100 p.p.m. was used flowering was delayed by 12 days. The NAA was only effective if applied before flower bud differentiation occurred. The plants treated with 50 or 100 p.p.m. NAA had 4 and 5 leaves more than the unsprayed plants. The same results were obtained whether the sprays were applied every third day or daily. J.R.L.

684. Hollings, M., and Kassanis, B.
The cure of chrysanthemums from some virus diseases by heat.
J. roy. hort. Soc., 1957, **82**: 339-42, bibl. 4, illus.

The old hot-water treatments used to control nematodes (115° F. for 5 min. or 109° F. for 25 min.) failed to free chrysanthemum stools of any of several virus diseases. Attention was therefore turned to the effects of moderately high air temperatures maintained for long periods. A miniature glasshouse was designed and is described, in which plants could be grown for 3 to 4 weeks at 97°±2° F. This treatment was applied to plants of several varieties infected with one or more of 7 different viruses. Plants were freed from aspermy stunt and ring pattern viruses, but not from viruses B, D, vein mottle and an unidentified virus. Precautions needed to avoid reinfection and the use of the method to provide a nucleus of healthy stock plants are discussed.—Plant Path. Lab., and Rothamsted exp. Stat., Harpenden.

685. Brierley, P., and Smith, F. F.
Symptoms of chrysanthemum flower distortion, dodder transmission of the virus, and heat cure of infected plants.
Phytopathology, 1957, **47**: 448-50, bibl. 2, illus.

Heat treatment of naturally-infected and graft-inoculated chrysanthemum plants gave successful control of the flower-distortion virus. Tip cuttings proved to be uniformly free of the disease.—Agric. Res. Center, Beltsville, Md.

686. McFadden, L. A.
Studies on the chemotherapy of bacterial blight of chrysanthemum, caused by *Erwinia chrysanthemi*.
Diss. Abstr., 1957, **17**: 10-11, being *Publ.* 19,779 of 113 pp.

In greenhouse tests Chloromycetin, streptomycin, Aureomycin, Terramycin, penicillin G and tetracycline almost completely inhibited development of *Erwinia chrysanthemi*, when chrysanthemum cuttings were stood in the antibiotic solutions for 4 hours before being planted in the rooting medium. Streptomycin gave excellent control of blight whether it was absorbed from antibiotic or nutrient solutions, or added to the rooting medium as a drench or to the root hormone powder. Foliar sprays were ineffective. Streptomycin was absorbed by, but not readily translocated in, treated cuttings. A 6-hour treatment with 50 p.p.m. or 100 p.p.m. streptomycin delayed rooting for as much as 10 to 15 days, but the addition of IAA partially overcame this inhibition.—Cornell Univ.

687. Vernon, J. D. R.
An eriophyid mite causing damage to chrysanthemums.
Plant Path., 1957, **6**: 111, bibl. 2.

The mite *Epitrimerus alinae* has recently been reported on chrysanthemums from several nurseries. Five days after spraying some plants with Metasystox all the mites were dead.—N.A.A.S., Wolverhampton.

688. Flint, H.
Lighting of the geranium and mum stock plants for more cuttings.
Bull. N.Y. St. Flower Grs, 1957, No. 139, pp. 1-2.

Geranium plants, variety Ricard, and chrysanthemum plants, variety Gold Coast, were grown from July or August until April under natural light and with weak light (about 300 f.c. at the centre of each plot) supplied throughout every night or throughout alternate nights. Night temperature was kept at 60° F. Cuttings were taken at weekly intervals and their numbers and weights recorded. With the geraniums the total numbers of cuttings produced per plant were 50·2 with no lighting, 58·1 with lighting on alternate nights, and 71·4 with lighting on every night. With the chrysanthemums the comparable figures were 62·2, 69·8 and 76·6. With both plants the most pronounced increase due to lighting occurred in Nov.–Dec., but with the geraniums, though not with the chrysanthemums, the response in March–April was nearly as great. Costings suggest that the use of supplementary lighting to increase the output of cuttings should be an economic proposition. —Dep. Floric., Cornell Univ.

689. Amer, F. A., and Williams, W. T.
Leaf-area growth in *Pelargonium zonale*.
Ann. Bot. Lond., 1957, **21**: 339-42, bibl. 3.

The curve of growth in area of *Pelargonium* leaves against time is strongly asymmetrical, and cannot be fitted by the usual logistic curve. It is shown that the Gompertz curve provides an excellent fit, and the significance of its parameters is discussed. [Author's abstract.]—Bot. Dep., Univ. Southampton.

690. Lindstrom, R. S., and Wittwer, S. H.
Gibberellin and higher plants. IX. Flowering in geranium *Pelargonium hortorum*.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **40**: 225-31, bibl. 2.

GB at 1 to 10 p.p.m. spray confined to flower buds increased size of inflorescence and petals in the two geranium varieties tested and prolonged the life of the inflorescence in one of them.

691. Baudendistel, R.
Geranium storage.
Bull. N.Y. St. Flower Grs, 1957, No. 140, p. 4.

Foliage infection with *Botrytis* is the main factor limiting the time for which geranium cuttings can be stored. Preliminary trials showed that infection was apt to be severe at higher temperatures and indicated that cuttings could be successfully stored for a month if the following procedure were adopted: Store only dry, disease-free cuttings at 31° F. in air-tight containers, in which calcium chloride is placed to absorb excess moisture; dust cuttings before and after storage with Parzate; and, finally, provide a moist medium for rooting.—Dep. Floric., Cornell Univ.

692. Sproston, T., Jr.
Studies in the disease resistance of *Impatiens balsamina*.
From abstr. in *Phytopathology*, 1957, **47**: 534-5.

Evidence suggests that disease resistance is due to the presence of various polyphenolic compounds, which occur in the plant as glycosides or in other bound forms but which are freed on invasion of the fungus.

693. Bali, P. N., and Tandon, S. L.
Colchicine induced tetraploidy in *Linaria vulgaris*.
Curr. Sci., 1957, **26**: 256-8, bibl. 2, illus.

The flowers borne on the tetraploid plants were large and conspicuous, but their pollen fertility was low (38·84% compared with 93·45% in diploid plants), and the fruit and seed set was poor. [See also *H.A.*, 27: 2762a.]—Univ. Delhi. J.R.L.

694. Nakamura, S., and Okasako, Y.
On the germination of perilla seed. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 28-32, bibl. 8.

Seeds of *Perilla ocymoides* var. *crispa* remain dormant for 3–5 months after harvest. Dormancy is particularly deep for the first month. Immediately after harvest germination is better if the seeds are kept in the dark, but thereafter they become positively photosensitive. Dormancy can be broken effectively by decoating, treating with H_2SO_4 or pre-chilling the seed. Germination of seeds in the dark is better following storage in the light. The rate of germination of seeds sown in soil is low but can be increased considerably by first soaking them in water in the light for a day.

695. Durbin, R. D.
Physiology of chloroplast breakdown in saintpaulia.
From abstr. in *Phytopathology*, 1957, **47**: 519.

Chloroplast breakdown in the palisade layer of *Saintpaulia ionantha*, resulting in the physiological ring spot disease, takes place in 2 stages. The first stage appears as darkened areas in the leaf tissue. It is induced within a few seconds when leaf temperature is lowered by contact with cold water or air. Light is not necessary for this stage but may enhance injury by increasing leaf temperature above the ambient. In the second stage chlorophyll in the dark areas is degraded, and yellowish ring patterns and blotches are produced. This stage is light dependent; in the dark, the darkish areas may disappear and the plastids appear to return to normal. In light photosynthetic rate and total chlorophyll, carotene, and xanthophyll contents decline with time. The loss is most rapid during the first 12 hours. Neither high CO_2 nor O_2 levels, nor the infiltration into the leaves of kinetin, glucose, or oxidizing or reducing agents appear to affect this reaction. The respiration rate of affected tissue does not, however, differ from that of healthy tissue. It is unlikely that the phenomenon involves a photochemical oxidation process such as solarization. [For similar work see *H.A.*, 26: 1970.]

696. Miller, R. O.
Snaps need good drainage.
Bull. N.Y. St. Flower Grs, 1957, No. 140, pp. 1-3, bibl. 3.

Snapdragon plants of the variety Christina were submerged in water to the rim of the pot for periods of 10, 5, 4, 3, 2 and 1 and ½ days. Waterlogging for as short a time as 3 days resulted in a significant decrease in subsequent growth in a well-drained soil. On the basis of the results of this experiment it is suggested that careful attention be paid in providing drainage, preparing soil and watering to prevent waterlogged conditions. [Author's summary.]—Dep. Floric., Cornell Univ.

697. Isaac, I.
The effects of nitrogen supply upon the *Verticillium* wilt of antirrhinum.
Ann. appl. Biol., 1957, **45**: 512-15, bibl. 3.

Isolates of 5 *Verticillium* spp. grown on media adequately supplied with sodium nitrate showed significantly greater ability to penetrate antirrhinum host plants than did isolates grown under N-starved conditions. Similarly, the isolates induced wilt more rapidly in plants growing in soil supplied with normal or excess N than in plants growing in N-deficient soil.—Univ. Coll. Swansea.

Bulbs, tubers, etc.

(*See also* 11, 749, 753c, e, k, q, t-v, 979.)

698. Yasuda, I., and Yokoyama, N.
Research on the planting in spring of bulbs normally planted in the autumn. [Japanese, with English summary ½ p.]
Sci. Rep. Fac. Agric. Okayama Univ., 1957, No. 10, pp. 51-66, bibl. 6, illus.

Experiments were carried out in which bulbs and corms of William Pitt and William Copeland tulips, King Alfred daffodil, Dutch iris, ranunculus, anemone and Tunberg and Easter lilies were planted in October, as is normal, while others were stored at room temperature or at 0° C. and a batch of each planted every month from November until March. The bulbs all kept as well at room temperature as in the cold, but the tulip bulb which had been cold stored grew faster and produced taller stems than the non-cooled bulbs. With the daffodils the later the bulbs were planted the worse they grew. With tulips and irises times of flowering and flower quality were similar for all planting dates between October and February, but when bulbs were planted on March 25 only small late blooms developed and there was much blindness. In most cases there was about 30 days' difference in the time of flowering between bulbs planted in October and those planted in March, but with anemones and ranunculus the difference was nearly 6 weeks. J.R.L.

699. Ministry of Agriculture, London.
Stem and bulb eelworm on narcissi, hyacinths and related bulbs. Stem and bulb eelworm on tulips.
Adv. Leafls Minist. Agric. Lond. **460** and **461**, pp. 7 and 4, both illus. and priced 3d.

The life histories, alternate host plants and injuries caused by 3 races of *Ditylenchus dipsaci* are described. Both daffodil and hyacinth bulbs can be freed of the nematode by hot-water treatment at 110° F. for 3 hours. The first attempts to treat tulips in this way resulted in severe damage, but recent work suggests that treatment may be practicable, if done early enough and if the bulbs are not wanted for flower production in the first year. For soil treatment D-D fumigation followed by a liquid nematocide drench is effective, but it is not economical on large areas. For tulips roguing may be effective, if all plants in a radius of 3 ft. from an infested plant are also removed.

700. Wegner, I.-G.
Cyclamenpollenflug im Gewächshaus. **(Pollen transport in glasshouse cyclamen.)**
Dtsch. Gartenb., 1957, **4**: 207-8, bibl. 7, illus.

Pollen traps in a cyclamen crop collected fairly large amounts of air-borne pollen, which appears to be frequently released and transported as pollen masses. This is an important point for seed producers, as some cross-pollination between varieties of different colours seems likely to occur.—Inst. Zierpfl., Berlin-Köpenick.

701. van de Sande, J.
Een nieuw botrytis-bestrijdingsmiddel voor de tuinbouw. **(A new material for botrytis control in horticulture.)**
Cult. Hand., 1957, **23**: 316-17, 338-9, bibl. 4, illus.

A dust, B500, manufactured in Germany, has been tested in Belgium in a cyclamen nursery. It was applied to plants at intervals of 2–3 weeks, and gave excellent control of *Botrytis cinerea* infection without inhibiting growth. Good results were also obtained in small tests with chrysanthemums.

702. Robelin, R., and others.
Numéro spécial sur le dahlia. **(Special number on the dahlia.)**
Jardins Fr., 1957, Vol. **3**, No. 4, pp. 125-59, illus.

This number contains 7 articles on dahlias, covering history, types, growing by amateurs, varieties, a calendar of cultural operations, propagation, and diseases and pests and their control.

703. Kaldewey, H.
Wachstumsverlauf, Wuchsstoffbildung und Nutationsbewegungen von *Fritillaria meleagris* L. im Laufe der Vegetationsperiode. **(Growth processes, growth substance formation, and movements due to growth processes in *Fritillaria meleagris* during the growing season.)**
Planta, 1957, **49**: 300-44, bibl. 39, illus.

Under normal conditions both prefloral and postfloral maxima in stem growth were observed in *Fritillaria*. Extension growth was inhibited when ovaries or flower buds were removed during flowering, but heteroauxin was a satisfactory substitute for the reproductive organs. The effect of ovary removal or decapitation in the young stage on extension growth in the basal part of the stem was not marked. Cell division in the flower stalk was reduced by removal of young buds; heteroauxin applications increased the rate of cell division, but cell number remained below that of normal plants. Growth substances appeared to be synthesized chiefly in the flower, followed by downward translocation. Growth substance production was higher during periods when the growth rate was high. Stem curvature was affected by growth substance and inhibitor formation, and the author describes the mechanism affecting cell division and extension.—Univ. Hamburg.

704. Tsukamoto, Y., and Ueno, Y.
Dormancy of gladiolus corms. (III) On changes in carbohydrate content and their relationship to dormancy. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 137-40, bibl. 7.

The relationship between chemical composition and sprouting percentage was studied in corms given the following treatments: (a) 35° C. for 10 days followed by 2° C. for 23–25 days, (b) 2° C. for 33–35 days and (c) controls. Water contents were not affected by treatment. Contents of reducing sugars decreased during high temperature treatment, but increased after cold storage. Non-reducing sugars increased during cold storage. Contents of reducing sugars were positively correlated with sprouting percentages. [For parts I and II see *H.A.*, 25: 832 and 27: 701.]

705. Hendrix, J. W., and Hall, H. R.
Relationship of stomatal size and number in gladiolus to varietal response to atmospheric fluorides.
From abstr. in *Phytopathology*, 1957, **47**: 523.

The relative sensitivity of 42 varieties of gladiolus was determined by making planimeter measurements of the extent of foliar scorch on a series of leaves systematically selected from plants grown within a fluoride pollution area near Spokane, Washington. Stomatal frequency and the size of stomatal wells were determined from corresponding leaves selected from plants grown near the periphery of the pollution zone. These studies revealed (1) wide differences in varietal sensitivity to atmospheric fluorides (33–85% of total leaf area scorched); (2) wide differences in average stomatal frequency among varieties (145–257 per sq. mm.); and (3) noticeable differences in the average diameter of stomatal wells (6·78–15·74 μ). A plotting of these results reveals a fair, but necessarily constant, correlation between varietal reaction and each of 2 factors: stomatal frequency and stomatal well diameter. In general, low stomatal frequency and/or small well size were associated with resistant varieties, whereas the more sensitive varieties tended to possess higher stomatal frequency and/or greater well size.

706. Griesbach, R. A., and Voth, P. D.
On dormancy and seed germination in *Hemerocallis*.
Bot. Gaz., 1957, **118**: 223-37, bibl. 38.

Freshly-harvested seeds germinated to a limited extent within a narrow temperature range, the optimum being 22°–25° C. Differential peeling experiments showed that a thin endosperm membrane covering the protruding tip of the hypocotyl was responsible for delayed germination at 22° C., while at 16° C. endosperm storage tissues also restricted gaseous diffusion. Periods of 1 or 2 months stratification were sufficient to break dormancy, and in controlled conditions 0°–10° C. was shown to be the general range for after-ripening. Stratified seeds germinated over a greater temperature range than did unstratified seeds. No inhibitory substance was found in non-stratified seeds, nor was a stimulatory substance found in after-ripened seeds.—DePaul Univ., Chicago, and Univ. of Chicago.

707. Ghisleni, P. L.
Resultati di un'esperienza circa l'influenza della luce su la fioritura del giacinto (*Hyacinthus orientalis* L.). **(Results of an experiment on the effect of light on the flowering of hyacinths (*Hyacinthus orientalis*)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 404-6, bibl. 7.

Reducing or increasing natural day length by 4 hours just after hyacinths had started to grow had no significant effect on the date of appearance of the inflorescence or of its pigmentation. The duration of flowering, however, was reduced by increasing, and very slightly prolonged by shortening, the day length.

708. Rodionenko, G. I.
The measurement of the surface growth of ensiform iris leaves by tattooing. [Russian.]
Bot. Žurnal, 1957, **42**: 909-11, bibl. 3, illus.

With a fine drawing pen dipped in Indian ink parallel rows of perforations were made in the leaves of young iris plants without upsetting their subsequent development. These "tattoo" marks afford a simple means of measuring growth differentials in iris and similar monocotyledons.

709. Salinger, J. P.
Iris rust.
N.Z. Gdnr, 1957, **13**: 655-6, illus.

In 1956 outbreaks of iris rust (*Puccinia iridis*) occurred in New Zealand on several species and varieties, which are named. Recommended control measures include lifting bulbs or plants, burning old leaves, etc., dipping bulbs twice in an organic mercury bulb dip, and, during the growing season, spraying both bulbous and rhizomatous irises 4 times with zineb at 2 lb./100 gal.—Dep. Agric., Wellington.

710. Robb, S. M.
The culture of excised tissue from bulb scales of *Lilium speciosum* Thun.
J. exp. Bot., 1957, **8**: 348-52, bibl. 16.

Explants from the bulb scales of *Lilium speciosum* were cultured *in vitro*, where they proliferated and differentiated to regenerate bulblets in 15–16 weeks. Morphologically, regeneration takes place from mesophyll tissue, buds arising from more superficial layers, and roots from deeper layers. The regenerative capacity of explants has been shown to be seasonal and of a localized nature, basal explants regenerating freely, apical explants never regenerating. The seasonal response may be correlated with the vegetative state of the plant at the time of excision. [Author's summary.]—Massey Agric Coll., Univ. N.Z.

711. McWhorter, F. P.
Association between *Rhizoctonia* and yellow coloration of Easter lily bulbs.
Phytopathology, 1957, **47**: 447-8, illus.

Treatment of Croft lily yearlings with PCNB tended to increase growth and control the appearance of yellow blotching on the outer scales. Stem bulblets were dusted with PCNB and grown on to yearling size. After lifting it was apparent that yearlings grown from treated lots were heavier and of better quality than those from untreated lots. The improved appearance of treated bulbs was correlated with the control of *Rhizoctonia solani* on the scales.—Ore. St. Coll., Corvallis.

712. Broadbent, L., Green, D. E., and Paton, J. B.
Virus diseases of the narcissus trial at Wisley.
J. roy. hort. Soc., 1957, **82**: 395-401, bibl. 2.

From 1952 onwards attempts have been made to rid the trials of new narcissus stocks at Wisley of the stripe virus disease. Early roguing and the use of barrier crops of rye have limited the spread of the virus from healthy to infected plants but have not eliminated infection. It is clear that many stocks sent for trial are infected before arrival, and it is also probable that in some varieties the symptoms may be masked in certain seasons. Thus, quarantining new stocks for a year before submitting them to trial, whilst eliminating those most seriously infected, will not provide a final solution. This must await the development of a method of testing for viruses that is more reliable than visual inspection.—Rothamsted exp. Stat. and R.H.S. Gdns, Wisley.

Lawns and sports turf.

(*See also* 371-377.)

713. Huffine, W. W.
Sunturf Bermuda: a new grass for Oklahoma lawns.
Bull. Okla agric. Exp. Stat. **B-494**, 1957, pp. 7, bibl. 2, illus.

Cynodon magennisii is a sterile triploid hybrid which spreads by means of above-ground runners. It produces a dense, hardy turf which is finer in texture and darker green in colour than other bermuda grasses and is adapted to areas of full or nearly full sunlight.

714. Wittwer, S. H., and Bukovac, M. J.
Gibberellin and higher plants. V. Promotion of growth in grass at low temperatures.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 682-6, bibl. 2.

Gibberellin applied to turf, especially to *Poa* spp. and Bermuda grass, but also to *Agrostis*, *Festuca* and *Lolium* with slightly less effect, resulted in grass growing weeks ahead of untreated turf. *Zoysia* did not respond.

715. Kerr, T. W.
Leafhoppers infesting lawns in Rhode Island.
J. econ. Ent., 1957, **50**: 372, bibl. 1.

In 1956 the principal leafhoppers infesting lawns were *Macrosteles fascifrons*, *Deltocephalus pulicaris*, *Endria inimica* and *Graminella nigrifrons*. A single spray of 1·2 oz. of actual DDT in 7·5 gal. per 1,000 sq. ft. effectively reduced populations of all species for 2 months. A similar treatment with methoxychlor had a similar effect on *G. nigrifrons* and *D. pulicaris* but controlled *M. fascifrons* and *E. inimica* for only 1 month.—R.I. agric. Exp. Stat., Kingston.

Orchids.

716. Crovetto, A.
La semina asimbiotica delle orchidee. **(Non-symbiotic propagation of orchids from seed.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 306-10, bibl. 15.

Recent work in Europe and the U.S.A. is reviewed, stressing the importance of restricting the pH range of culture media to 4·8–5·2 and of maintaining asepsis in the early stages. Germination time (4–5 days in fresh and 3–4 months in stored seeds) has been reduced and seedling growth improved by certain growth substances and vitamins.

717. Grohs, B.
Über die "Schwarzfleckenkrankheit" an *Vanda tricolor* und *Vanda coerulea* (Fam. Orchidaceae) bei ihrer gärtnerischen Kultur. Vorläufige Mitteilung. **(On the "black spot" disease of cultivated *Vanda tricolor* and *V. coerulea*. Preliminary communication.)** [English, French and Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, *Ser. B*, 1957, **7**: 271-8, bibl. 3, illus.

The disease is shown to be of physiological origin, viz. a disturbance in the water relations. Its symptoms are described and the anatomy of affected tissues is illustrated in detail.

Succulents.

See 754g.

Roses.

(*See also* 753d, g, z, 754k.)

718. Mameli Calvino, E.
Orientamenti e progressi nella coltivazione industriale della rosa. **(Trends and progress in commercial rose growing.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 347-74, bibl. 28, illus.

The following aspects of rose growing in Italy are dealt with: soils and fertilizing; use of chelates to control minor-element deficiencies; hydroponic cultivation; foliar nutrition; cultivation under glass and polythene; sprinkler irrigation and misting; injury from hormone weed-killers; rootstocks; seed treatments and seedbed management; control of pests and diseases; breeding, and legislation on registering new varieties; rose growing for perfumery.—Staz. sper. Floric., Sanremo.

719. Veski, V.
A promising rootstock for roses. [Russian.]
Sad i Ogorod, 1957, No. 8, p. 69.

In experiments in Estonia budding roses on *Rosa canina* resulted in a higher percentage take than budding on *R. afzeliana*, but more plants survived the winter on the latter rootstock. Growth was also more vigorous and flowering freer on *R. afzeliana*.

720. de Boer, S.
Het voorkomen van het vroegtijdig uitlopen van rozen. **(The prevention of early bud break in roses.)**
Jaarb. Proefst. Boomkw. Boskoop 1956, p. 122.

IPC and MENA (methyl ester of naphthalene acetic acid) were applied in December or March to stored roses. December treatment with MENA had no effect on inhibiting early bud break, and a March application of MENA was less effective than IPC. It is concluded that early bud break in roses stored for transport could be successfully inhibited by dusting the plants with IPC in February or March.

721. Langhans, R. W.
Some effects of intermittent foliar water applications on the physiology of plants and the growth of greenhouse roses.
Diss. Abstr., 1957, **17**: 10, being *Publ.* 20,019 of 175 pp.

Leaf temperatures of roses and chrysanthemums were lower when grown under an intermittent mist spray than when grown without mist. Plants growing under mist lost almost no water by transpiration, although their stomata remained open all day. Radioactive P was translocated at the same rate in misted and non-misted plants. Dormant rose plants started between mid-June and mid-September under mist produced more shoots and grew faster for the first 2 months than those started by the normal commercial method; plant losses under mist were negligible. At the beginning of the flowering period misted plants produced more flowers with longer stems than non-misted plants, but later production figures were similar. [See also *H.A.*, 25: 4234 and 4235.]—Cornell Univ.

722. Wildon, C. E.
Growth of rose, alfalfa and tobacco plants as affected by different sources of iron.
Quart. Bull. Mich. agric. Exp. Stat., 1957, **39**: 628-34, bibl. 10.

Rooted cuttings of Better Times rose and seedlings of common Havana tobacco were planted in soil containing iron frit or disodium ferrous versenate. All plants in the latter medium died within a few days, but after repeated attempts tobacco plants were eventually established. Rose cuttings in the soil containing frit grew well. The addition of frit containing Fe and Mn resulted in tobacco plants with a greater dry weight than those from untreated soil.

J.R.L.

723. Weinstein, L. H.
Senescence of roses. I. Chemical changes associated with senescence of cut Better Times roses.
Contr. Boyce Thompson Inst., 1957, **19**: 33-48, bibl. 26.

Experiments were carried out to study major chemical changes which occurred in cut Better Times roses during aging. The fresh weight of petals increased until the bloom was fully open, after which it decreased. Petal, receptacle, and leaf tissues decreased in dry weight during senescence, presumably due to respiratory loss. Concentration of cyanidin 3,5-diglucoside in petal tissues increased initially and then fell off. Proteolysis went on uniformly in petals, receptacles, and leaves during aging. Free glucose was rapidly depleted. Malic acid accumulated in petal tissues, especially during the later stage of senescence, while it was lost in other organs. In addition, succinic, citric, and two unknown organic acids were detected in rose tissues. With some exceptions, free amino acids and amides accumulated during early stages of senescence, then decreased. Asparagine was the dominant amino compound in petal, receptacle, and stem tissues. Free amounts accumulated about 20-fold in petal tissues by the end of the experiment. It is suggested that free ammonia contributes to the "bluing" common to aging red roses. [Author's summary. See also *H.A.*, 27: 3785.]

Other trees and shrubs.

(*See also* 16, 91, 249, 608, 753f, i, j, n-p, s, y, 754c, e, f, 829, 950, 981, 1006.)

724. TAMURA, T., WATAHARA, T., AND ITO, K.
Studies on cuttings of ornamental trees and shrubs. (I). On the season for taking cuttings and the rooting percentage. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 45-53, bibl. 26.

Cuttings of over 50 ornamental trees and shrubs were taken each month throughout the year. With conifers it was found that cuttings could be taken successfully in seasons other than the spring. A number of species, particularly *Juniperus chinensis*, were successfully propagated in the autumn. Spring and autumn were found to be as suitable as the summer for taking cuttings of many broad-leaved evergreen trees and shrubs. *Laurus nobilis*, *Pyracantha angustifolia*, *Camellia japonica* var. *hortensis* and *C. sasanqua* all did best when propagated in the autumn. With many deciduous trees it was possible to take cuttings successfully for a much longer period in the spring than had been anticipated. *Prunus yedoensis* rooted only when cuttings were taken in August. The authors state that the results may have been due to the fact that the work was done in a part of Japan which has a relatively warm and moist winter. J.R.L.

725. DE BOER, S.
Proeven met winterstekken. **(Experiments with winter cuttings.)**
Jaarb. Proefst. Boomkw. Boskoop 1956, pp. 19-21.

Cuttings taken in March and heeled-in in the open gave better results than those stored in sawdust in an outdoor frame or in a glasshouse. Tip cuttings of *Cornus alba elegantissima* and *C. alba gouchaultii* rooted better than basal cuttings, whereas with *Cotoneaster acutifolia* and *C. bullata* basal cuttings gave better results.

726. WELECZKA, J.
Elektrische Bodenheizung bei der Azaleen- und Erikenvermehrung. **(Electric soil warming for propagating azaleas and ericas.)**
Gartenwelt, 1957, **57**: 219-20, illus.

A brief description is given of a soil heating lay-out used in an azalea and erica nursery. Low voltage current is passed through 3-inch wire netting laid below a 9 cm. thick rooting medium. Where cheap night current is available the soil may be heated to a night temperature of 25° C. and allowed to cool off to 18° C. during the day. Alternatively the soil temperature (at 3 cm.) may be thermostatically controlled at 23–24° C.

727. KOMAROV, I. A.
Rooting of soft wood cuttings of some shrubs as related to the heteroauxin content of the shoots. [Russian.]
Lesnoe h-vo, 1956, No. 4, pp. 76-7, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 9925.

Heteroauxin determinations were made in the current season's shoots of clematis and deutzia before, during and after flowering. The substance was detected by treating shoot sections with 0·1% ammonium ferric alum in 25% H_2SO_4. Positive reaction was obtained only during flowering, and cuttings taken at this time rooted the best.

728. BROERTJES, C.
Ontbladering met chemische middelen. **(Defoliation by chemicals.)**
Jaarb. Proefst. Boomkw. Boskoop 1956, p. 123.

Forsythia intermedia spectabilis was satisfactorily defoliated by 2% and 1% endothal, with or without copper sulphate. No effect was obtained with *Weigelia*, *Deutzia*, *Spiraea*, *Cornus* and *Philadelphus* species. Various Malling rootstocks were defoliated by 2% endothal, with or without copper sulphate, but more satisfactory results were obtained with 5% copper oxychloride.

729. KOSUGI, K., AND OTHERS.
Studies on flower bud differentiation and development in some ornamental trees and shrubs. VI. On the time of flower bud differentiation and flower bud development in *Gardenia jasminoides* Ellis, *G. jasminoides* Ellis var. *ovalifolia* Nakai and *Magnolia denudata* Desr. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 37-42, bibl. 15, illus.

In *G. jasminoides* the terminal flower bud was differentiated by the end of July and secondary flower buds on the laterals beneath this at the beginning of September; but with var. *ovalifolia* the secondary buds were differentiated at the end of August. The terminal buds were visible macroscopically about 40 days later and flowered the following July. No shoots arose from the base of the secondary flower buds until the following spring. With *M. denudata* flower bud differentiation was observed on May 12, pollen mother cells were formed by July 7 and the flowers bloomed the following March. J.R.L.

730. MOLOTKOVSKIJ, G. H., AND IZMAJLOV, A. F.
Chlorophyll and ascorbic acid content and catalase activity in the leaves of certain weeping forms of woody plants in relation to polarity. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **113**: 1165-7, bibl. 14.

The highest ascorbic acid and chlorophyll concentrations and greatest catalase activity occurred in the leaves of the shoot apices in both weeping and upright forms of *Fraxinus*, *Salix*, *Sophora*, *Forsythia* and *Caragana*, although the actual values were lower in the case of weeping forms.

731. Antipov, V. G.
The effect of gases discharged by industrial plants on the seeds of trees and shrubs. [Russian.]
Bot. Žurnal, 1957, **42**: 1230-2, bibl. 7.

For planting around industrial sites trees and shrubs should be raised from the seed of plants growing under similar conditions and showing resistance to those conditions. Seeds of yellow acacia [*Caragana arborescens*], honeysuckle [*Lonicera tatarica*] and a maple [*Acer* sp.] obtained from plants grown near a chemical factory discharging methane, ethylene, acetone and acetic acid fumes produced a higher percentage germination, both outdoors and in the laboratory, than seeds of the same species from a park in Leningrad. The gases also appeared to have antiseptic properties, which reduced fungal infection of the seeds. [See also *H.A.*, 27: 2752.]

732. Saito, K.
Studies on the induction of polyploid flower plants and their utilization. XI. On the autotetraploid plant of fiveleaf akebia. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **26**: 43-4, bibl. 5, illus.

Tetraploid plants of *Akebia quinata* suitable for pot culture were obtained from seeds of normal diploid plants which had been treated with colchicine. These tetraploids had larger, deeper-coloured leaflets and larger flowers but grew more slowly than the diploids. Well-shaped fruits were obtained on the tetraploid plants but none set on the diploids, probably because the latter were not self-fertile, whereas the tetraploid flowers were fertilized by the diploid pollen. [For part X see *H.A.*, 27: 3715.]

733. (Blaney, L. T.)
Azalea propagation by cuttings possible.
Ore. ornam. Nursery Dig., May 1957, summarized in *Flor. Exch.*, 1957, **129**(11): 15.

Tip cuttings taken in late May or early June were dipped in a powdered rooting compound and inserted in pure peat moss, with or without equal proportions of sharp sand, under constant mist. Terminal buds were pinched out as soon as they had formed. Rooted cuttings were potted and grown in a glasshouse at about 65° D. and under continuous illumination. Successful results have been obtained with both *Azalea mollis* and Knaphill varieties.

734. Penningsfeld, F.
Kupfermangel bei Azaleen in Torf. (**Copper deficiency of azaleas grown in peat.**)
Reprinted from *Süddtsch. ErwGärtn.*, 1957, Vol. **11**, No. 38, pp. 2, illus.

Leaf yellowing and tip die-back appeared in some azalea seedlings shortly after pricking out; new growth was stunted. Symptoms became marked when the plants received full sunlight. Treatment with copper sulphate corrected the trouble completely in 8 weeks. It is suggested that Cu deficiency disturbs the water relations of the plant, and that this situation is aggravated by high temperatures and bright light. The deficiency appears to occur most frequently in plants grown in moorland peat and is accentuated by high phosphate applications. Recommended control measures are soil or foliage applications of copper sulphate.

735. Tepe, W.
Wasserhärte—Salzgehalte—Nährstoffhaushalt. Versuche mit Eriken und Azaleen in Geisenheim. (**Water hardness, salt content and nutrient status. Studies with ericas and azaleas at Geisenheim.**)
Gartenwelt, 1957, **57**: 224-5, illus.

Some results of 4 years' studies at Geisenheim are summarized. Water containing bicarbonates may be injurious to azaleas and ericas due to increased soil pH. Treatment with sulphuric acid neutralizes the carbonates, and water so treated has been shown to result in less rust infection. Nutrient studies have led to the following manurial programme being recommended: before applying fertilizers the nutrient status of the soil should be determined, and adjusted according to local conditions, viz. water contents of salts; when the soil reaches a temperature critical for root growth (varying according to local conditions) only N is given, followed after 3 to 5 such applications by a complete nutrient solution; the frequency and level of manuring should be varied according to the weather, the end of dormancy and bud formation.

736. Vogel, H., and Kneipp, O.
Bewässerungsmöglichkeiten bei Eriken. (**Irrigation methods for ericas.**)
Gartenwelt, 1957, **57**: 228-30, illus.

Methods of watering potted ericas growing in the open during the summer are described. For large areas sprinkler systems and hand-operated and motor-driven mobile irrigation units can be used. The mobile units are briefly described.

737. Maatsch, R., and Rünger, W.
Ein orientierender Düngungsversuch mit *Erica gracilis*. (**Studies on the manuring of *Erica gracilis*.**)
Gartenwelt, 1957, **57**: 221-2, illus.

Ten manurial treatments were given to *Erica* plants and their effect on growth and flowering was observed at the beginning of October. Plants which had received no N since mid-July were smaller and lighter green in colour, but they flowered earlier than other plants. High K levels did not appear to be injurious, and flowering was not affected.

738. Heimann, M.
Erikensterben—Ursache und Bekämpfung. (**Erica "death"—cause and control.**)
Gartenwelt, 1957, **57**: 222-4, illus.

Erica "death", caused by *Pestalotia versicolor*, should be controlled primarily by clean cultural conditions, including propagation from healthy material. Fungicide tests *in vitro* showed that Chinosol, Albertan and Quexi had good or very good inhibitory action against the fungus.—Inst. PflKrankh., Geisenheim.

739. Stahn, B., and Reimann, E.
Das sogenannte Erica-Sterben und seine Ursachen. (**The so-called erica death and its cause.**)
Dtsch. Gartenb., 1957, **4**: 186-9, bibl. 3, illus.

Mycological studies on *Pestalotiopsis versicolor* are reported. Breeding ericas for resistance does not seem promising. Cultural conditions to avoid infection must be regulated; N manuring and soil pH values being the most important.—Karl-Marx-Univ., Leipzig.

740. WESTAWAY, S. J.
Sexual and asexual propagation of euonymus.
Rep. Proc. 13th annu. Mtg west. Canad. Soc. Hort. 1957, Regina, Sask., pp. 65-6, bibl. 4.

Euonymus seed may be kept for 2 years if stored dry, and perhaps longer if kept in sealed containers at about 41° F. Seed stratified for 90–120 days at 32°–50° F. and sown in the spring gave 30–70% germination. Greenwood cuttings of *E. nanus* and *E. turkestanicus* set in moist sand under controlled greenhouse conditions gave 70% rooting, and *E. japonicus* has also rooted readily in a pliofilm propagating case.—Univ. Manitoba, Winnipeg.

741. ANON.
L'enracinement des boutures de *Ficus*. **(Rooting of *Ficus* cuttings.)**
Rev. hort. Algér., 1957, **61**: 105.

A method, giving good results in 14 days, consists in grafting a 4–5 cm. length of thick root on to the base of a cutting, immediately below the last leaf, and using a warm frame.

742. SEIGLE, L.
À propos des flamboyants. **(Flamboyants.)**
Jardins du Maroc, 1957, **44**: 357-8.

Seeds of *Poinciana regia* from Indo-China germinated in Morocco when 2 years old, when sown in the open in summer. There was no germination in pots, or from spring sowing, or from one-year old seed.

743. EICHHOLZ, W.
Ein Beitrag zur vegetativen Vermehrung des Sanddorns (*Hippophae rhamnoides* L.). **(Vegetative propagation of sea buckthorn.)**
Dtsch. Baumsch., 1957, **9**: 186-90, bibl. 17, illus.

The author discusses vegetative propagation of sea buckthorn, which, in contrast to propagation by seed, enables plants of known sex to be sold at 1-year-old. The most successful method was to take cuttings in early spring from 1-year-old wood and insert them in soil leaving one bud above the surface. Shoots from young bushes gave higher percentage strike than those from older bushes. Rooting was slightly improved by growth substance application. Propagation by suckers was less satisfactory, and grafting is not recommended. —Inst. Pflzücht., Karl-Marx-Univ., Leipzig.

744. DENGLER, H. W. (EDITOR).
Handbook of hollies.
Nat. hort. Mag., 1957, Vol. **36**, Special Issue, pp. 193, bibls, illus.

In 1947 the newly organized Holly Society of America produced its first modest booklet. Since then there has been an immense expansion of interest in hollies in North America, an interest which is admirably reflected in the preparation of the present handsomely illustrated handbook by the Holly Society working in conjunction with the American Horticultural Society. Twenty-seven experts have contributed articles, which have been arranged in three sections. The first of these, "An introduction to the hollies", includes an account of hollies in folklore and legends and detailed descriptions of the species and varieties of North American, Oriental and English hollies. The second section on the "Culture of the hollies" contains information on planting, pruning, pests and diseases, and methods of propagation and hybridization. The last section on the "Uses of the hollies" contains three articles on their cultivation as an orchard crop in different parts of the U.S.A. and also includes suggestions on their uses in landscape architecture, for hedges and topiary, as dwarf Japanese bonsai trees, and in cut foliage arrangements. Finally, holly collections in the U.S.A. are listed, and the handbook is rounded off with a useful index to species and varieties.

745. DORMER, K. J., AND HUCKER, J.
Observations on the occurrence of prickles on the leaves of *Ilex aquifolium*.
Ann. Bot. Lond., 1957, **21**: 385-98, bibl. 3, illus.

The number of prickles upon the edge of a leaf is related by complex laws to the size of the leaf, the number of prickles on the other edge, the number of prickles on other leaves of the shoot, the phyllotaxy of the shoot, and the intrinsic asymmetry of the leaf. The available evidence indicates that prickles arise by the interaction of not less than 5 recognizable physiological systems, whose mathematical properties have been partly elucidated. It is found that shoots having opposite directions of phyllotaxy differ quantitatively as well as qualitatively. [From authors' abstract.]—Univ. Manchester.

746. YOUNG, R. A., AND BUDDENHAGEN, I.
Fungus causing holly blight is revealed by Oregon study.
Flor. Exch., 1957, **129**(1): 13.

Leaf and twig blight of holly has been shown to be caused by *Phytophthora ilicis* and the symptoms are described. The development of green algae on the leaf surfaces can be another commercial problem. Both of these troubles may be largely prevented by selection of a moderately open planting site and by adequate spacing and pruning to allow air movement. For chemical control a fixed copper spray may be used. Other troubles described are sooty mould, brown canker, and cold and mechanical injuries.—Ore. St. Coll., Corvallis.

747. (SWENSON, K. G., AND ADLERZ, W. C.)
How to avoid scale on holly, camellias.
Flor. Exch., 1957, **129**(2): 37.

Soft brown scale on holly and camellia plants may be controlled by spraying with malathion at 6 lb. of 25% w.p. in 100 gal., preferably in June. Control of cottony and lecanium scales may be obtained with malathion or chlorthion sprays in August or early September.—Ore. St. Coll., Corvallis.

748. VOLOŠIN, M. P.
Retention of viability in laurel seed for spring sowing. [Russian.]
Agrobiologija, 1957, No. 2, pp. 129-31.

At Yalta laurel seed was stored indoors at room temperature, or kept in shallow layers of sand or soil in trenches 0·8 m. deep and in litter under trees. The best results (95% germination) were obtained from trench storage, especially when the pericarp was previously removed.

749. (Raabe, R. D., and Sciaroni, R. H.)
Soil drenches as a control of root rot in poinsettias.
Flor. Exch., 1957, **129**(11): 49.

Fungicidal oil drenches were applied to potted poinsettias for control of *Rhizoctonia*, *Pythium* and *Thielaviopsis* spp. The most effective treatments were a PCNB-Fermate mixture and Panogen 15. Root growth was improved after all treatments. The PCNB-Fermate mixture has also been effective with Croft lilies, both as a pre-planting dip and a soil drench.

750. de Boer, S., and de Vogel, P.
Bestrijding "dradenschimmel" in kas en bak. **(Control of "thread" disease in glasshouse and frame.)**
Jaarb. Proefst. Boomkw. Boskoop 1956, p. 88.

"Thread" disease, probably caused by *Rhizoctonia solani*, may be controlled by sprays of 0·3% captan given at 5-day intervals. Young rhododendron plants were not injured.

751. Tyce, G. M.
Growth substances in relation to the rooting of *Salix fragilis* cuttings.
Ann. Bot. Lond., 1957, **21**: 499-512, bibl. 20.

The content of growth-promoting substances and the rooting capacity of *Salix fragilis* cuttings were both low in early dormancy and higher in late dormancy and in summer, but there was not an exact correlation in all months. It was found that extracts of *S. fragilis* cuttings taken in dormancy strongly inhibited the action of IAA on the growth of *Avena* coleoptile segments. This inhibiting influence was less in extracts of cuttings taken at the end of dormancy and in summer. Extracts of cuttings which had been left in water to root showed a striking decrease in their inhibitory action on IAA. It was obviously desirable that the growth-promoting and growth-inhibiting substances present in these extracts of cuttings should be separated and identified. A few preliminary qualitative experiments were performed using paper partition chromatography.—King's Coll., Newcastle upon Tyne.

752. Knowles, R. H.
Seedling production in *Viburnum trilobum*, Marsh.
Rep. Proc. 13th annu. Mtg west. Canad. Soc. Hort. 1957, Regina, Sask., pp. 66-9, bibl. 1.

The removal of the endocarp, and more especially its removal followed by thorough rinsing in water, hastened and increased the germination of seeds of *Viburnum trilobum* sown in vermiculite and kept at 20° C. Extracts from the endocarp had an inhibiting effect on the growth of wheat and flax roots at high concentrations, but a stimulating effect on the growth of flax roots at low concentration. Preliminary results are also reported of studies on epicotyl dormancy in seedlings kept at 5° and 20° C.—Univ. Alberta, Edmonton.

Noted.

753.

a Amici Fabricatore, J.
Le malattie delle piante ornamentali osservate in Italia. Dicotyledoneae. Parte terza. **(Diseases of ornamental plants in Italy. Part 3.)** [English summary 7 lines.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, *Suppl.* pp. i-xxx, bibl. 223.
Parts I and II noted *H.A.*, 27: 3815a.

b Anderson, E. B.
Hellebores.
J. roy. hort. Soc., 1957, **82**: 279-93, illus.
Descriptions of *Helleborus* spp. and hybrids, and notes on soils, propagation and diseases.

c Anderson, J. B. R., and Clark, M. R. M.
The culture of freesias.
Adv. Leafl. W. Scot. agric. Coll. **67**, 1957, pp. 3.
In West of Scotland, with emphasis on temperature control.

d Anon.
Bulgarian roses and attar of roses.
World Crops, 1957, **9**: 387.
Notes on history of *R. damascena* and the production and processing of its flowers.

e Anon.
Note sur des essais de culture de différentes variétés de tulipes. **(Note on trials with different tulip varieties.)**
Jardins du Maroc, 1957, **44**: 359-61.
Of 10 Dutch varieties only 2 flowered normally at Casablanca.

f Bond, G.
The development and significance of the root nodules of *Casuarina*.
Ann. Bot., Lond., 1957, **21**: 373-80, bibl. 15, illus.
Functioning like those of legumes.

g Bousson, L.
Protégeons nos roses. **(The protection of roses.)**
Jardins du Maroc, 1957, **44**: 361-9.
Pests and diseases in Morocco and their control.

h Bruce, A. B., and Ross, R.
The propagation of ferns from spores.
Gdnrs' Chron., 1957, **142**: 141, illus.
Methods described.

i Campbell, R. B.
Trees of Iowa.
Bull. Ia agric. Exp. Stat. **P121**, 1956, pp. 62, illus.
Native species described and illustrated.

j Carra, P., Théau, A., and Benazouz, O.
Arboriculture d'ornement. **(Ornamental trees and shrubs.)**
Rev. hort. Algér., 1957, **61**: 113-28, 154-64, illus.
Species in Algeria, their requirements, propagation, etc. [continuation of *H.A.*, 27: 3815j].

k Clark, M. R. M., Grainger, J., and MacLagan, D. S.
Diseases and specialised treatment of freesias.
Adv. Leafl. W. Scot. agric. Coll. **68**, 1957, pp. 3.
Temperatures for plants and corms; disease and pest control.

l Coggiatti, S.
La gerbera, elegantissima margherita. **(Gerbera, a graceful daisy.)**
Ital. agric., 1957, **94**: 698-700, illus.
General culture, with details of raising from seed.

m Colvin, B., Cane, P., and White, L. M.
Garden design in relation to reduction of labour and maintenance costs.
J. roy. hort. Soc., 1957, **82**: 294-302.
Suggestions by three landscape architects.

n Connors, C. H.
Rhododendrons and their kin.
Circ. N.J. agric. Exp. Stat. **575**, 1956, pp. 16, illus.
Culture of rhododendrons, azaleas, kalmias and other ericaceous shrubs.

o Dickey, R. D., West, E., and Mowry, H.
Ornamental vines for Florida.
Bull. Fla agric. Exp. Stats **571**, 1956, pp. 72, bibl. 1, illus.
General notes on planting and care, and descriptions of about 90 species.

p Fazio, S.
Pruning hedges, shrubs and trees.
Bull. Ariz. agric. Exp. Stat. **284**, 1957, pp. 14.
Well-illustrated recommendations for deciduous and evergreen types.

q Feinbrun, N.
The genus *Crocus* in Israel and neighbouring countries.
Kew Bull., 1957, No. 2, pp. 269-85, bibl. 33, illus.
Botanical descriptions of 12 species.

r Forsberg, J. L.
How to recognize and combat common China aster diseases.
Ill. St. Flor. Ass. Bull., No. 172, reprinted in *Flor. Exch.*, 1957, **129**(4): 10, 13.
Fusarium wilt, yellows, rust, foot rot, leaf blight and leaf spots.

s Glocker, K., Krüssmann, G., and Fortmann, H.
Beiträge zur Kenntnis der Industriefestigkeit der immergrünen Gehölze. **(Studies on the resistance of woody evergreens to industrial gases and dusts.)**
Dtsch. Baumsch., 1957, **9**: 85-92, 124-8, 150-3, 173-7, bibl. 14, all illus.
A survey in the Ruhr area.

t Ibbett, W. C.
Commercial anemone growing.
Agriculture, Lond., 1957, **64**: 274-8.
Growing in S.W. England.

u Kelsheimer, E. G.
Insects and other pests of gladiolus and their control.
Circ. Fla agric. Exp. Stats **S-91**, 1956, pp. 24, illus.

v Lothian, T. R. N.
***Crinum flaccidum* (Murray or Darling lily).**
J. roy. hort. Soc., 1957, **82**: 344-7, illus.
This handsome Australian species in its natural habit and in the Botanic Garden, Adelaide.

w Maccario, G.
Una pianta esotica coltivata per il fiore reciso, *Strelitzia reginae* Banks. **(An exotic plant grown for cut flowers, *Strelitzia reginae*.)**
Frutticoltura, 1957, **19**: 581-3, illus.
Cultivation in Italy.

x Montanari, V.
Aspetti e problemi della floricoltura italiana. **(Aspects and problems of Italian floriculture.)**
Riv. Ortoflorofruttic. ital., 1957, **41**: 233-50.
A regional survey of production.

y Neiswander, R. B.
Control of gall makers on shade trees.
Amer. Nurserym., 1957, **106**(7): 16, 76-9, illus.
Galls caused by midges, mites, aphids and cynipids [see also *H.A.*, 27: 1760].

z Nikolov, N.
La rosa oleifera e l'olio di rosa in Bulgaria. **(The oil-bearing rose and rose oil in Bulgaria.)**
Ital. agric., 1957, **94**: 591-4, illus.
Rosa damascena and *R. alba*; growing, harvesting, extraction.

754.

a Okada, M.
Classification of chrysanthemum varieties according to their flowering responses to environment. [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1957, **26**: 59-72, bibl. 18, illus.
Six groups, based on photoperiodic and temperature responses.

b Parrett, R.
The modern delphinium.
J. roy. hort. Soc., 1957, **82**: 379-89, illus.
Varieties, raising seedlings and culture.

c Penningsfeld, F.
Azaleenernährung in Torf. **(Azalea nutrition in peat.)**
Gartenwelt, 1957, **57**: 226-7, illus.
Results from 8 years' research at Weihenstephan summarized.

d Perkins, H. O.
Landscape planning for the home grounds.
Ext. Bull. Rutgers Univ. Ext. Serv. **304**, 1957, pp. 15, illus.
Basic design and planting composition for New England gardens.

e PICO, J. A.
Contribución al problema de la poda de plantas ornamentales en la ciudad de San Miguel de Tucumán. (**Contribution to the problem of pruning ornamental plants in the city of San Miguel, Tucumán.**)
Misc. Univ. nac. Tucumán, Fac. Agron., **2**, 1955, pp. 16, bibl. 4, illus.
Shaping of trees in city streets and squares.

f PLUMRIDGE, A. J.
Magnolias.
J. Agric. Vict., 1957, **55**: 535-8, illus.
8 species and their propagation and cultivation described.

g RAMBELLI, A.
Marciume apicale delle cactacee da *Helminthosporium cactivorum* Petrak. (**Apical rot of cacti due to *Helminthosporium cactivorum*.**)
Riv. Ortoflorofruttic. ital., 1957, **41**: 303-5, bibl. 1, illus.
A brief description, mentioning control with captan.

h ŠAVROV, L. A.
Structural anomalies in the floral reproductive organs of poppies (*Papaver* spp.). [Russian.]
Bot. Žurnal, 1957, **42**: 1249-53, bibl. 9, illus.
Papaver nudicaule and *P. oreophilum.*

i SEELEY, J. G.
Fertilizing greenhouse crops.
Flor. Exch., 1957, **128**(25): 12-13, 15, 40.
Recommendations from Cornell University for roses, carnations and lilies.

j STENNING, L.
Two unusual plants.
J. roy. hort. Soc., 1957, **82**: 391-2, illus.
Dorstenia bornimiana and *Utricularia alpina* and their culture at Kew.

k STOÏANOVA-IVANOVA, B., AND IVANOFF, D.
Sur la composition des hydrocarbures du stearoptène de l'essence de rose Bulgare. III. Hydrocarbures nonsaturés. (**The composition of stearoptene hydrocarbons of Bulgarian rose oil. III. Unsaturated hydrocarbons.**) [Russian summary 9 lines.]
C.R. Acad. bulg. Sci., 1957, **10**: 193-6, bibl. 6.
About 4·5% consists of eicosene. [For part II see *H.A.*, 25: 3045.]

l VAN STEVENINCK, R. F. M.
Factors affecting the abscission of reproductive organs in yellow lupins (*Lupinus luteus* L.). 1. The effect of different patterns of flower removal.
J. exp. Bot., 1957, **8**: 373-81, bibl. 11.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

See 31, 32, 71, 148, 359, 362-364, 822g, h, u, w, 823e, 969, 983, 987, 996, 1009.

Avocadoes.

(*See also* 822c, d, f, k, n, 823c, g, h, 825.)

755. GILLESPIE, H. L.
Stem-rooting varietal clones by means of "juvenile growth phase" leafy-stem nurse cuttings.
Yearb. Calif. Avoc. Soc. for 1957, pp. 94-6, bibl. 4, illus.

Leafy-stem [softwood] cuttings taken from young avocado seedlings root easily, whereas in older cuttings leaf drop occurs and rooting is retarded. When "juvenile" leafy cuttings of a Mexican-type seedling were bark grafted onto defoliated cuttings of Fuerte and placed in a hot bed, with bottom heat at 70–75° F., mean air temperature 64° F. and humidity above 80%, at first aerial roots appeared at the union and then the Fuerte section rooted. The time required for rooting by this method was only a little less than that required for rooting ordinary Fuerte cuttings with their own leaves, but the percentage success was much greater. [See also *H.A.*, 27: 1789.]

756. COIT, J. E.
Black polyethylene plastic for mulching newly planted trees.
Yearb. Calif. Avoc. Soc. for 1957, p. 99.

Sheets, 5 ft. square, with a slit for the trunk were used successfully as a mulch for newly planted avocado trees. The squares were laid in the tree basin with the corners reaching over the basin and held down by a spadeful of earth. Small holes were made in the plastic at the bottom of the basin to allow water penetration. The mulch controlled weeds, conserved moisture and raised soil temperature in the spring. The use of plastic mulch on furrow-irrigated trees is being tested.

757. WALLACE, A., AND NORTH, C. P.
Iron chelates for chlorotic avocado trees.
Yearb. Calif. Avoc. Soc. for 1957, pp. 136-40, bibl. 4, illus.

A new iron chelate, EDDHA or Chel 138 (ethylenediamine di[o-hydroxyphenyl acetic acid]), was found very effective on calcareous soils and at 1 lb. per tree cured 35-year-old chlorotic trees. Other chelates at 10 lb. per tree were also effective but were uneconomical.

758. HAAS, A. R. C., AND BRUSCA, J. N.
Leaf malady of avocado trees.
Calif. Agric., 1957, **11**(10): 14-15, illus.

The leaves of seedlings of the Mexican variety Topa Topa and of plants of Fuerte-Carr-Hybrid budded on several rootstocks developed numerous light-coloured, translucent spots when the plants were grown in a glasshouse in various nutrient cultures. Comparable plants grown in the open were normal, but developed leaf symptoms when transferred to the glasshouse. Affected leaves did not recover when glasshouse plants were moved out of doors, but leaves subsequently produced on these plants were normal. It is suggested that the disorder may have been due to a combination of high humidity and low light intensity in the glasshouse.—Univ. Calif., Riverside.

759. EBELING, W., AND PENCE, R. J.
Avocado pests.
Yearb. Calif. Avoc. Soc. for 1957, pp. 25-33, illus.

The pests dealt with are the omnivorous looper (*Sabulodes caberata*), amorbia (*Amorbia essigana*), orange tortrix (*Argyrotaenia citrana*) and also latana scale (*Hemiberlesia lataniae*) and greenhouse thrips (*Heliothrips haemorrhoidalis*). In 2 groves at Santa Paula 8 materials were tried in 1954–56, and practically complete control of *S. caberata* and *H. lataniae* was obtained with 50% DDT w.p. and with 25% parathion w.p., both at 2 lb. per 100 gal. Varietal differences in the severity of attack were noted, Fuerte being the most susceptible to both pests. In 2 groves at Encinitas lead arsenate at 4 lb. per 100 gal. was also found effective. In a Fuerte orchard in Leucadia partial control of *A. citrana* was obtained with a mixture of 25% TDE (DDD) w.p. and 15% Aramite w.p. both at 2 lb. per 100 gal., the latter being applied for protection against avocado brown mites. It is suggested that considerable control of all pests could be obtained by cultural methods such as thinning out orchards, removal of dead twigs and branches and in the coastal areas by topworking Fuerte trees.

760. DELPHEY, C. C.
Fuller rose beetle a pest of avocados.
Yearb. Calif. Avoc. Soc. for 1957, pp. 47-8, bibl. 1.

For the control of *Pantomorus godmani* applications in the summer or early autumn of 50% cryolite dust or of 5 to 10% DDT dusts have been found very effective. Treatment should be repeated as often as necessary.

Citrus—propagation and rootstocks.

(*See also* 822a, 825, 985, 990.)

761. TAGER, J. M., AND CAMERON, S. H.
The role of the seedcoat in chlorophyll deficiency (albinism) of citrus seedlings.
Physiol. Plant., 1957, **10**: 302-5, bibl. 3.

The incidence of chlorophyll-deficient seedlings in citrus was eliminated by removal of the seed coats before sowing. When excised embryos were germinated in contact with seed coats, varying percentages of chlorophyll-deficient seedlings were produced.—Univ. Calif., Los Angeles.

762. BOVÉ, J.
Le bouturage des citrus. **(Citrus propagation from cuttings.)**
Fruits d'Outre Mer, 1957, **12**: 253-9, bibl. 23, illus.

The article reviews recent work, including the possible use of orange juice with NAA and aneurin for rooting and the effects of auxins, kinetin and gibberellin on initiation and growth of roots. The main conclusion is that orange, although more difficult to propagate than lemon, will produce roots on cuttings allowed to keep their leaves and placed in mist chambers in full sunlight.

763. SELLE, R. M.
Method for identifying citrus rootstocks.
Calif. Citrogr., 1957, **43**: 37-9, illus.

Small pieces of root bark are soaked for 30 min. in dimethoxypropane. Spots on filter paper are prepared from the resultant extract and also from the extract treated for a further 30 min. with anhydrous aluminium chloride. The spots are compared under long-wave ultra-violet light with similar spots prepared from roots of known varieties.—Occidental Coll., Los Angeles.

764. GRANT, T. J., MOREIRA, S., AND COSTA, A. S.
Observations on abnormal citrus rootstock reactions in Brazil.
Plant Dis. Reptr, 1957, **41**: 743-8, bibl. 13.

In a rootstock planting at Tiete symptoms consisting of pegs and an orange-yellow coloration occurred at the bud-unions of 8-year-old clonal Pera sweet orange tops on Florida rough lemon and on trifoliate orange rootstocks. Trees composed of the same Pera orange tops on sweet lime or on Rangpur lime showed no xyloporosis symptoms on these rootstocks. In this planting, similar but even more marked bud-union symptoms of indentation into the wood and cracking of the bark were observed on trees with Eureka lemon tops on trifoliate-orange rootstock. In another planting at Ribeirão Preto xyloporosis symptoms occurred on both sweet lime and Rangpur lime rootstocks with Baía navel orange tops. The inner bark and wood-pitting symptoms on Rangpur lime appeared first and were stronger at the ground level and developed upward toward the union. Association of abnormal symptoms at the bud unions of sweet orange tops on Florida rough lemon rootstock with xyloporosis and cachexia and the indicated differences in causal agents are discussed in relation to the observed rootstock reactions in Brazil. [From authors' summary.]—U.S.D.A., Orlando, Fla, and Inst. agron., Campinas, São Paulo, Brazil.

765. KNORR, L. C.
Re-appraising citrus rootstocks, with particular reference to their susceptibility to virus diseases. III. Rough lemon (*Citrus limon* (L.) Burm. f.).
Citrus Mag., 1957, **20**(2): 8-10, 21, 24-5, bibl. 4, illus.

About 70% of Florida citrus is worked on rough lemon. The need to eliminate bench-rooted seedlings, bulls (outsized plants) and runts from nursery beds is emphasized. If the bulls and runts are removed, the remaining seedlings, about 95% of the total, will be of nucellar origin and will possess all the characteristics of the Florida rough lemon. The reaction of this rough lemon strain to xyloporosis, tristeza, exocortis, psorosis and podagra is discussed. Podagra (from the Greek, swollen foot) is a disease of kumquats budded on rough lemon, and affected trees deteriorate rapidly. The symptoms resemble those of exocortis, but it remains to be shown that the disease is transmissible. [Parts I and II were noted in *H.A.*, 27: 2827r and 3892t.]—Fla Citrus Exp. Stat., Lake Alfred.

766. BITTERS, W. P., AND OTHERS.
High and low budding of citrus trees.
Calif. Citrogr., 1957, **42**: 370-1, 384, 386, bibl. 3, illus.
High and low budding of citrus.
Calif. Agric., 1957, **11**(11): 5-7, 15, illus.

Malformations at the bud union are apt to occur in various citrus stock-scion combinations, but are perhaps most common and pronounced in varieties and strains of lemon worked on Cleopatra mandarin and Sampson tangelo. Seedlings of both these stocks are slow growing and are often budded close to the ground. Observations indicate that union malformations are apt to be much more pronounced in trees budded low than in trees budded high. In the early years this appears to have little effect on top growth, but there is evidence in some cases that as the trees become older those that are low-budded become stunted. The critical height for budding is not yet known, but the observations suggest that for lemons it should not be less than 8 inches.

Citrus—nutrition.

(*See also* 212.)

767. Maillard, S., and Hibon, J.
Extrait du rapport présenté au IVème congres de l'agrumiculture méditerranéenne de Tel-Aviv, mai 1956, sur le diagnostique foliaire. **(Extract from the report presented at the IVth congress of Mediterranean citrus-growing at Tel Aviv, May, 1956, on foliar diagnosis.)**
Fruits et Prim., 1957, **27**: 147-52.

Analyses of orange leaves in Tunisia indicated special need for N before flowering, at June drop and in late August. Autumn was the best time to apply P and K, unless these were included in quick-acting granular NPK fertilizers, which should be used in spring. An orange tree 15–20 years old, with an annual production of 150–200 kg. of fruit, should be given 4 kg. of 12–10–15 fertilizer in early spring, 750 g. of urea (45%) in May and the same amount of urea in July.

768. Jones, W. W., Embleton, T. W., and Steinacker, M. L.
Nitrogen fertilizers as related to orange quality and yield.
Calif. Citrogr., 1957, **43**: 3, 12.

A preliminary report is given on 2 experiments started in 1949, in which N was applied to mature Valencia oranges at different rates and at different seasons and by means of both soil and foliage applications. The results show that fruit production is liable to be reduced at low N levels. When N is increased above levels needed to maintain production quality suffers, the fruit becoming smaller, the peel thicker and the percentage of juice and the vitamin C content lower. There is some evidence that foliage applications of N are less detrimental to quality than soil applications and that the time of application is of importance both to yield and vitamin C content.—Univ. Calif., Riverside.

769. Konakahara, M.
Some effects of foliar sprays of monobasic potassium phosphate, two or three kinds of phosphoric acid and potash salt on flower bud formation on Satsuma orange trees. [Japanese, with English summary 1½ pp.]
Bull. Citrus Exp. Stat., Shizuoka, 1956, No. 3, pp. 3-24, bibl. 16, illus.

Foliar sprays of P and K salts were applied to Satsuma orange trees in an attempt to control biennial bearing. The most effective treatment was a 0·3% spray of KH_2PO_4 applied in an off-year just before bud burst. Trials with other salts indicated that the effect was due to the P rather than the K. The application of KH_2PO_4 in the on-year did not affect flower bud formation.

770. Pratt, P. F., and Goulben, B.
Potassium fixation in soil of a long-term fertility trial with citrus.
Soil Sci., 1957, **84**: 225-32, bibl. 13.

Where K was applied annually from 1927 to 1955 at 400 lb. per acre it did not penetrate below 24 inches in the soil and at 710 lb. per acre it failed to penetrate below 36 inches. The heavier the application, the greater was the percentage fixed. There was greater fixation below than above the 12-inch depth and moisture was favourable to the process.—Univ. Calif., Riverside.

771. Kuykendall, J. R., Hilgeman, R. H., and Van Horn, C. W.
Response of chlorotic citrus trees in Arizona to soil applications of iron chelates.
Soil Sci., 1957, **84**: 77-86, bibl. 8.

Comparative tests of 5 iron chelates were made on iron chlorotic leaves of lemon and orange trees growing on 5 different soil types in 2 areas of Arizona. Rapid and essentially complete regreening of chlorotic leaves of lemon and orange trees growing on sandy soils on the Yuma Mesa and the heavier silt and clay loam soils of the Salt River Valley was obtained with soil applications of HFeEDDHA at rates of 12 and 24 g. Fe per tree. Less rapid but satisfactory regreening was obtained from RA157Fe at a rate of 48 g. Fe per tree, and with NaFeDTPA at a rate of 96 g. Fe per tree. NaFeHEEDTA at the rate of 164 g. Fe per tree gave very satisfactory regreening of chlorotic lemon trees on the sandy Yuma soils, but only irregular and partial regreening of chlorotic orange trees on the heavier soils in the Salt River Valley. [From authors' summary.] —Univ. Arizona.

772. Lisanti, L. E., and Catalano, M.
Sul contenuto in acido ascorbico delle arance del Metapontino. Effetti della concimazione con solfato ferroso. **(The ascorbic acid content of oranges grown in the Metapontino district. Effects of fertilizing with ferrous sulphate.)** [English summary ⅓ p.]
Nuovo G. bot. ital., 1956, **63**: 220-38, bibl. 67.

The vitamin C content of Ovaletto di Calabria oranges was higher than that of most Californian and South African varieties, having a range of 56·76–94·46 mg. per 100 c.c. of juice and increasing during ripening. Preliminary experiments involving applications of ferrous sulphate produced no significant increase in vitamin C or sugar content, but are to be repeated, together with applications of Cu, Mn and Zn, which gave positive results.

Citrus—climatic responses and irrigation.

(*See also* 790, 823d.)

773. Ladarija, —.
A method of studying frost resistance in citrus in an artificial climate in the laboratory. [Georgian.]
Bjul. Vses. n.-i. in-ta čaja i subtrop. kul'tur, 1954, Nol 3, pp. 34-47, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 10,381.

A description is given of the equipment and methods used in frost resistance studies on 2-year-old lemons, variety Novogruzinskij, on trifoliate rootstocks and 2-year-old seedlings of the same variety. It was found that resistance was affected by the duration of frost, which, when prolonged from 1 to 10 hours, greatly increased the degree of injury. The rate at which the temperature rose or fell was also important; when the rate of change was increased from 0·5 to 3° C. per hour the injury was increased. Increasing the relative humidity by 5–15% above the normal (75–80%) at a constant temperature had no effect, but an increase of 20–25% considerably increased injury to the grafted plants and to a lesser degree to the seedlings. A 3 m./sec. wind accompanying frost slightly increased injury. When high humidity (90–95%) was combined with wind the injury suffered by the shoots amounted to 86·5% compared with 77% in still air.

774. Noro, T.
Some emergency treatments for citrus fruits after damage by salt-laden winds. [Japanese, with English summary 1 p.]
Bull. Citrus Exp. Stat., Shizuoka, 1956, No. 2, pp. 40-50, bibl. 8.

Fruit growth ceased on trees that were completely defoliated by a salt-laden typhoon. On such trees the roots also ceased to supply water, and it would appear that the trees owe their survival to the transfer of water from the fruits to the twigs. Ripening Satsuma fruits, though normal in appearance, contained high acid and low sugar contents. On trees that retained many of their leaves 2,4-D was the most satisfactory of several materials tested to prevent defoliation.

775. Taylor, O. C., Cahoon, G. A., and Stolzy, L. H.
Why do Navel oranges split?
Calif. Citrogr., 1957, **43**: 32-4.

In an experiment supplementary irrigation had no effect on the number of fruits splitting in 1955, a year of little splitting, or in 1956, a year of severe splitting. However, comparison of the climatic data for the two years suggests that splitting may be associated with a drop in mean maximum temperature coinciding with an increase in the relative humidity and with a pronounced decrease in the rate of fruit growth.

776. Samish, R. M.
Irrigation requirements of a young citrus orchard.
Ktavim, 1957, **7**(2/3): 123-39, bibl. 27.

Marsh seedless grapefruit trees, aged 3 to 7 years, and growing in a very heavy soil in a semi-desert climate were irrigated when the soil moisture in the second foot fell to 13, 29 and 45% respectively of available water. Infrequent irrigation resulted in a reduced top/root ratio in comparison with frequent irrigation. Infrequent irrigation reduced yields, affecting both size and number of fruits. Quality also suffered with low water supply by increased rind thickness, a reduction in sugar/acid ratio and increased concentrations of both sugar and acids. The optimum performance of 4 to 6 year old trees was obtained with 600 cu. m./dunam 1 [dunam = 1,000 sq. m.] of water per annum under experimental conditions. Theoretical and practical aspects are discussed and the author concludes that while soil moisture determinations and meteorological measurements can give valuable aid to the grower in his irrigation problems, the tree itself is more likely to be a reliable indicator as to when irrigation is required.

777. Hilgeman, R. H., and Sharples, G. C.
Irrigation trials with Valencias in Arizona.
Calif. Citrogr., 1957, **42**: 404-7, bibl. 1.

In a 7-year trial, under desert conditions in Arizona, Valencia oranges on sour orange rootstocks were grown at 3 moisture levels. Irrigation water was applied when approximately 55, 70 and 95% of available water had been removed from the top 24 inches of soil, at which stage moisture tensions at a depth of 30 inches were about 300, 425, and 700 cm. In 5 out of the 7 years the high-moisture trees (A) made significantly greater trunk growth than the medium-moisture trees (B), and in every year the latter made significantly greater growth than the low-moisture trees (C). Yields in all the treatments were similar for the first 3 years, but thereafter reduced tree size and restricted fruit set in the C trees produced yields significantly lower than those of the A and B trees. The fruit from the C trees varied more in size from year to year than that of the A and B trees and tended to be of poorer quality. In the calcareous soil used for this experiment the high rate of irrigation tended to accentuate Fe-deficiency chlorosis, to decrease the leaf contents of N, K and Na and to increase that of Ca. Neither P nor Mg was affected by irrigation.—Dep. Hort., Univ. Ariz.

778. Jones, W. W., Cree, C. B., and Embleton, T. W.
Relation of tillage practices to water infiltration, orange yield and quality.
Calif. Citrogr., 1957, **43**: 28-30.

In this study [a long-term fertilizer and tillage experiment on Washington Navel oranges at Riverside] it has been shown that plots on which a winter cover crop was grown had a greater water intake than plots that were kept clean by discing. When the clean cultivated plots were changed to non-tillage, net water intake increased, so that one year after the change they had a greater water intake than did the cover cropped plots. The difference has been greater each year. Yields have increased with increase in net water up to about 4·5 acre-inches per acre per irrigation. Fruit size has increased with increasing water intake. Fruit from nontilled plots has a thinner peel, a higher percentage of juice and a higher soluble solids: acid ratio than does fruit from winter cover cropped plots. [Authors' abstract.]

779. Kuraoka, T., and others.
Fundamental investigations on the irrigation of citrus trees.
J. hort. Ass. Japan, 1957, **26**: 83-94, bibl. 17, illus.

Studies on the movement of irrigation water in the soil and its relation to the irrigation of citrus trees are described. Young orange trees grown in boxes showed diurnal fluctuations in the moisture content of the root zone, which became irregular about 5 days after irrigation. At this time the capillary adjustment during the night was not adequate to replace daytime losses, and the rhizosphere gradually dried out. The critical soil moisture content for the growth of citrus trees was shown to lie between 1 and 8 atmospheres. Wilting first makes itself apparent in young, tender leaves, and concurrently the growth of the fruit is checked; one to 3 days later shoot growth is checked. After root pruning young Iyo oranges on trifoliata it was observed that shoot wilt occurred on the same side as that of the root pruning. The critical moisture content for the movement of soil moisture was ½ atmosphere, which corresponds to the moisture equivalent. In order to keep the moisture content of the rhizosphere soil above the critical point for citrus trees, that of the surrounding root-free soil should be kept at least above the moisture equivalent.—Inst. Hort., Ehime Univ.

Citrus—various cultural aspects.

(*See also* 778, 822 l, 823b, f.)

780. PROSSER, D. S., JR.
Operation and power requirements of tractors and related equipment for citrus production.
Circ. Fla agric. Exp. Stats **S-90**, 1955, pp. 12, bibl. 11, [received 1957].

The results are summarized of a series of tests made at the Citrus Experiment Station, Lake Alfred, to determine the power requirements of tractors when used for the many implements, sprayers, etc., now commonly employed in Florida citrus groves. Advice is also given on the types, maintenance and use of tractors.

781. SHUR, Y.
More about transplanting old trees.
J. roy. hort. Soc., 1957, **82**: 348-9.

A method successfully applied to citrus, olives and dates in Israel is outlined. Among its features are the excavation of a 10–12 in.×30–35 in. deep trench, in a circle with a diameter 5–6 times the diameter of the trunk. Near the outer side of this trench boards are placed and the space between them and the ball of earth is filled with humus, sawdust or wood-shavings. Within 12–18 months a mass of fine, fibrous roots develop in this medium, and the tree can then safely be undercut and transplanted.

782. RUSSO, F., MURATORE, A., AND PAPARELLA, R.
L'impiego del 2,4-D per aumentare la pezzatura dei frutti di mandarino. **(The use of 2,4-D for increasing fruit size in mandarins.)**
Riv. Agrum., 1957, **2**: 95-110, illus.

Mandarin fruit size was significantly increased and the average weight per fruit increased by 12% when 2,4-D was sprayed at 24 p.p.m. on young fruits averaging 17·7 mm. in diameter. Treatment of younger fruits at 16 p.p.m. gave smaller, but significant increases. Treated fruits were slightly slower than untreated in turning colour and developing smoothness of skin, but were of lower acidity than untreated fruits when ready for harvesting. There was no evidence that the effects were enhanced by adding urea. Adverse effects of 2,4-D on vegetative growth were negligible when the ester was used at the time of lowest vegetative activity. The treatment was distinctly economic.

Citrus—diseases and pests.

(*See also* 764, 765, 800-802, 822j, m, o, r, v, x-z, 823a, 1008.)

783. WEATHERS, L. G.
A vein-yellowing disease of citrus caused by a graft-transmissible virus.
Plant Dis. Reptr, 1957, **41**: 741-2, illus.

A disease of limequat (lime×kumquat) trees characterized by yellowing of the veins of the leaves has been found in California. The causal agent is readily transmitted from citrus to citrus by grafting. [Author's abstract.]

784. RIEUF, P.
Le problème du stubborn au Maroc. **(The problem of stubborn disease in Morocco.)**
Fruits et Prim., 1957, **27**: 161-7, bibl. 10.

The chief difficulty is to identify with certainty trees infected with the virus of stubborn disease, because in Morocco the most characteristic symptom (acorn fruits) is rarely manifest. The "crazy top" symptom develops when soil conditions produce an impermeable layer within 30–50 cm. of the surface. In one instance flooding caused "crazy top", but there was a return to normal growth when favourable soil moisture conditions were restored. Certain trees reputed to be suffering from stubborn disease have recovered spontaneously. It is suggested that symptoms resembling those of stubborn disease may be produced by causes other than virus infection. The name pseudo-stubborn is sometimes used for these.

785. MCCLEAN, A. P. D.
Tristeza virus of citrus: evidence for absence of seed transmission.
Plant Dis. Reptr, 1957, **41**: 821.

In the course of 8 years thousands of citrus seedlings raised in South Africa have been examined or tested by graft-inoculation, but no case of a seedling carrying tristeza has been found. Among the species involved was the West Indian lime, and in this case all the parent trees were known to be infected with tristeza. Runts and other abnormal seedlings were also tested by graft-inoculation, but none was found to contain anything transmissible.—Div. Plant Path., Dep. Agric., Pretoria.

786. SCHARIF, G.
L'anthracnose des agrumes à Minab. **(Citrus anthracnose at Minab.)** [Iranian, with French summary pp. 3½.]
Ent. Phytopath. appl. Tehran, No. 16/17; Persian, pp. 4-17 (in reverse), French pp. 4-7.

Susceptibility of sweet limes (*Citrus limetta*) to anthracnose (*Colletotrichum gloeosporioides*) in Iran is attributed to the heavy nature of the soil, low general nutrient status, Zn deficiency and poor husbandry. On heavy soils the sour orange (*C. bigaradia*) is a useful rootstock for sweet lime, being resistant to anthracnose.

787. FISHER, F. E.
Control of citrus fruit russet in Florida with zineb.
Phytopathology, 1957, **47**: 433-7, bibl. 16, illus.

Citrus fruit russet was effectively controlled by a single application of zineb during July or early August [see also *H.A.*, 27: 3861]. Rust mite populations were depressed, but there were indications that russet was caused not by mites, but by a fungus, possibly *Cladosporium brunneo-atrum*.—Citrus Exp. Stat., Lake Alfred, Fla.

788. Di Martino, E.
Le formiche e i loro rapporti con gli agrumi. **(Ants and their connection with citrus.)**
Riv. Agrum., 1957, **2**: 111-24, bibl. 7, illus.

Traps, barriers and insecticidal treatments are reviewed. Chlordane, heptachlor, aldrin, endrin and dieldrin have generally given better results than DDT in soil treatment. In young orchards where the soil is unshaded, chlorinated organic compounds decompose too rapidly to be economic and are better used in paste forms brushed on the trunks.

789. Planes García, S., and del Rivero, J. M.
Contribución a la lucha contra los dípteros con insecticidas fosforados por medio de cebos azucarados. **(A contribution to fruit fly control with phosphorus insecticides in sugar baits.)**
Bol. Inst. nac. Invest. agron. Madrid, 1957, **17**(36): 69-84, bibl. 3.

Various phosphoric insecticides in 5% sugar solution were sprayed on a small part of the south side of orange and olive trees in an attempt to control *Ceratitis capitata* and *Dacus oleae*. Malathion and dipterex were highly effective for control of the Mediterranean fruit fly, and dipterex gave very promising results in preliminary trials against olive fly. Emulsion formulations were better than wettable powders.—Estac. fitopat., Burjasot, Valencia.

790. Jeppson, L. R., and others.
Influence of season and weather on citrus red mite populations on lemons in Southern California.
J. econ. Ent., 1957, **50**: 293-300, bibl. 7.

Populations of the citrus red mite, *Metatetranychus citri* (McG.), were evaluated at weekly intervals over a 3-year period in untreated plots in four lemon groves. Continuous temperature and humidity records were also obtained in each grove. The trends in mite population were correlated with seasonal growth cycles of the tree and with periods of high temperature and low humidity. It was found that citrus red mite populations on lemon trees tend to be highest during periods when there is maximum amount of new foliage growth. Lemons, however, produce sufficient new growth to sustain relatively high populations most of the year if weather conditions are favourable. Low humidity and moderate to high temperatures were unfavorable for mite development, and low humidities accompanied by high temperatures and winds appeared to make new plant growth less favorable for mite population development. Temperature and humidity extremes were not of sufficient frequency in orchards near the coast to keep populations low for any extended period, whereas in an orchard more interior and under more continental weather influence, longer periods of the year were unfavorable for mite development. [Authors' summary.]—Univ. Calif., Riverside.

791. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Correlation of spray treatments with citrus red mite population trends on lemon trees in Southern California.
J. econ. Ent., 1957, **50**: 300-7, bibl. 2.

Populations of citrus red mite, *Metatetranychus citri*, were evaluated at weekly intervals on trees in 2 lemon groves which were treated twice a year according to 14 or 15 different spray schedules. The most effective control was obtained when treatments were made at the beginning of major upward trends in population. Where orchards were so located that weather conditions were unfavourable for summer population peaks, treatments applied in August and in the spring (Feb.–May inclusive) resulted in effective control. Where high summer populations occur, treatments in October or November and at the end of June or July are suggested.—Univ. Calif., Riverside.

792. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Effectiveness of two new phosphate insecticides for control of mites injurious to citrus in California.
J. econ. Ent., 1957, **50**: 307-10, bibl. 1.

The effectiveness of several dosages and formulations of Hercules AC-528 (2,3-*p*-dioxanedithiol *S,S*-bis (*O,O*-diethyl phosphorodithioate) and Trithion (*S*-(*p*-chlorophenylthio)methyl *O,O*-diethyl phosphorodithioate) were evaluated by conventional spray, boom-spray, and spray-blower applications for control of citrus red mite, *Metatetranychus citri*. The results indicate that these materials varied in their effectiveness according to the dosage applied and were generally more effective by all three methods of application than similar applications of the formulations of ovex or petroleum oil currently used for control of this mite. Trithion and Compound 528 also resulted in control of six-spotted mite, *Eotetranychus sexmaculatus*, and Yuma mite, *Eotetranychus yumensis*, but were ineffective against citrus bud mite, *Aceria sheldoni*, and citrus flat mite, *Brevipalpus lewisi*. Field residues were toxic to adult citrus red mites for a longer period of time on oranges than on lemons. [From authors' summary.]—Univ. Calif., Riverside.

793. Spencer, H., and Selhime, A. G.
Experiments with Kelthane for the control of citrus red mites.
J. econ. Ent., 1957, **50**: 364-5, bibl. 5.

Emulsion and wettable powder sprays of Kelthane gave as good immediate control of citrus red mite, *Metatetranychus citri*, on oranges as Aramite or an oil emulsion, but had a longer lasting effect. Kelthane residues in the fruit were very low.—Ent. Res. Branch, U.S.D.A.

794. Anon.
El combate de la polilla de la naranja. **(Control of the orange moth.)**
Not. agríc. Serv. Shell Agric. Venezuela, No. 18, 1957, pp. 3-4, illus.

Simultaneous control of *Gymnandrosoma aurantium*, scale insects and aphids on citrus was obtained with a mixture of 1 l. of 25% DDT, 1½ l. of white oil and 200 c.c. of 50% malathion in 100 l. of water.

795. Georgala, M. B.
Calcium arsenate and the scale control programme.
Citrus Gr, 1957, No. 281, pp. 7-8, bibl. 1.

An experiment is described in which the toxicity of a parathion-malathion spray against red scale was not impaired by mixing it with calcium arsenate as compared with lead arsenate, both of which were applied to reduce fruit acidity. It is emphasized that this result was obtained when the spray was applied immediately after mixing, and that a delay might well cause a reduction in insecticidal efficiency.—S.A. Co-op. Citrus Exchange.

796. Clarke, O. F., Baines, R. C., and Moore, P. W.
Mulches show no effect in controlling nematodes.
Calif. Citrogr., 1957, **42**: 449.

A trial with alfalfa hay and organic manures was started at Riverside in 1948 and 11 other trials with a variety of organic mulches were started in different localities in 1954. So far none of the mulch treatments has had an appreciable effect on the number of nematodes found on citrus roots, despite the presence of 3 or more species of nematophagous fungi. The investigations are, however, being continued.

Citrus—fruit storage.

(*See also* 42, 66, 163.)

797. Mauri, N.
Essais sommaires d'un produit cireux contre la dessication des fruits d'agrumes après cueillette. **(A summary of tests with a wax product used to prevent water loss from citrus fruits after harvest.)**
Fruits et Prim., 1957, **27**: 117-21.

In 3 experiments weight losses of both oranges and lemons during storage were reduced by coating the fruits with wax emulsion (product S) after the fungicidal dip. The process showed particular promise for late orange varieties and for lemons.

798. Roistacher, C. N., Klotz, L. J., and Eaks, I. L.
Fumigation with ammonia gas for control of *Penicillium* decay of citrus fruits.
From abstr. in *Phytopathology*, 1957, **47**: 532-3.
Blue-green mold on citrus.
Calif. Agric., 1957, **11**(10): 11-12, illus.

Exposure of citrus fruit to an atmosphere containing 50–300 p.p.m. ammonia gas for 5–10 hours has repeatedly given control of the blue-green mould decay caused by *Penicillium italicum* and *P. digitatum*. A formula for predicting decay control without fruit injury was based on the product of gas concentration in the air surrounding the fruit multiplied by the duration of exposure (p.p.m. $NH_3 \times$ time in hours = ammonia index). Good control has been realized with an ammonia index of 500–3,000; injury of the fruit occurred above 3,000. Commercial gas treatments conducted since January, 1956, on both Navel and Valencia oranges have shown the complete practicability of ammonia fumigation for control of the blue-green moulds.

The second paper summarizes results obtained with oranges and lemons. They indicate the need for prompt treatment after picking, because at 68° F. *P. digitatum* will penetrate 1 mm. into the rind within 24 to 30 hours and will then be out of reach of the chemical.—Univ. Calif., Riverside.

799. Roistacher, C. N., and others.
Patterns of ammonia release in cartons as related to control of decay of citrus fruits.
Abstr. in *Phytopathology*, 1957, **47**: 533.

In attempts to formulate efficient ammonia-releasing compounds for use in cartons, gaseous emission patterns of such compounds were studied. These emission patterns were directly compared with the control of decay on oranges wounded and inoculated with *Penicillium digitatum* and *P. italicum*. Decay control under simulated refrigerator-car conditions was proportional to the quantity of ammonia emitted from pellets or sheets of various formulations. At controlled temperatures emission of ammonia from pellets and sheets was significantly curtailed at 32° F. as compared to emission at 50° or 68° F.; again, control was proportional to the quantity of gas released. In one experiment conducted under refrigerator-car conditions, ammonia gas was injected into 10 × 11 × 16½-in. cartons, each containing 100 wounded and inoculated oranges. Injections of ⅛, ¼, ½, or ¾ g. per carton were made on all combinations of the first, fifth, and/or ninth day after inoculation. Injections made the first day were not as effective as those made later. The best control of decay and the greatest reduction of spore viability resulted from 2 or 3 injections of ½ or ¾ g. per carton; there was no injury to the fruit.

800. Hopkins, E. F., and McCornack, A. A.
Effect of ammonia treatments in fibreboard cartons on stem-end rot and mold decay in Florida oranges.
Citrus Mag., 1957, **20**(3): 18-19, 22-5, bibl. 11, illus.

In an investigation throughout the 1956–57 fruit season, the effect of ammonia-producing compounds applied in fibreboard cartons on post-harvest decay in Florida oranges was studied. Two types of treatment were used, ammonium bicarbonate pads and ammonia pelletized mats. In the same experiments treatments with Dowicide A-Hexamine and with diphenyl pads were made for comparison. There was no significant reduction in stem-end rot as the result of ammonia treatments. Mold decay, however, was controlled. On the other hand, Dowicide A-Hexamine and diphenyl methods controlled both stem-end rot and mold. Based on 2 weeks' storage at 70° F. or 3 weeks' storage at 60° F. the relative effectiveness of the methods in controlling total loss from decay was: diphenyl, best; Dowicide A-Hexamine; ammonium bicarbonate pads; ammonia pelletized mats. Poor decay control with ammonia and its tendency to cause peel injury, darken fruit blemishes and stimulate the growth of superficial molds as observed in this investigation suggest that ammonia treatments of citrus fruits in cartons for the control of decay would not be commercially practical in Florida. [Authors' summary.]—Citrus Exp. Stat., Lake Alfred, and Fla Citrus Commiss.

801. KITAJIMA, H., AND YAMADA, S.
Studies on the control of citrus fruit decay in storage. IV. Control of decay by *o*-phenyl phenol aerosol. (1.) [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 95-104, bibl. 15, illus.

An aerosol releasing ortho-phenyl phenol at 2 g., hexamine at 1 g. and ammonium chloride at 1 g. per cu.m. inhibited the germination of *Penicillium digitatum* spores for 90 days. Treatment of oranges before storage in December caused no visible injury to the fruits, and gave rot control equal to that of a sodium *o*-phenyl phenol (Dowicide A) spray. In practical tests store fumigation with a phenyl phenol aerosol at 2 g. per cu.m. gave good control of rots.

802. ORIHUEL GASQUE, B., AND MERÍ PUIG, J.
Influencia de algunos factores sobre la aparición de cierto grado de fitotoxicidad en la naranja W. Navel frente al uso del ortofenilfenato sodico-hexamina. **(Effect of certain factors on the occurrence of definite toxicity symptoms in Washington Navel oranges due to the use of sodium orthophenylphenate with hexamine.)** [English summary ¾ p.]
An. Edafol. Fisiol. veg., 1957, **16**: 751-83, bibl. 17, illus.

The fruit was immersed in a mixture of 20% sodium orthophenylphenate, 1% hexamine and 0·4% sodium hydroxide at 15° C. Rinsing preserved the green colour of the calyx, greatly reduced lesions and completely prevented pitting of the skin, but increased storage rot. Drying in warm air after rinsing reduced lesions, but had no effect on pitting or on storage rot. Immersion for 12 min. led to more pitting than immersion for 4 min. In spite of its effect on rotting, rinsing was the most important factor in maintaining the commercial value of the fruit at a reasonable level during 4 weeks' storage.

Dates.

(*See also* 822b, i, s, t.)

803. HILGEMAN, R. H., SHARPLES, G. C., AND HOWLAND, L. H.
Effect of irrigation and leaf-bunch ratio on shrivel and rain damage of the Maktoom date.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 2-5, bibl. 7.

Mature Maktoom palms growing in a deep loam soil in the Salt River Valley of Arizona were irrigated under 2 programs during 4 years. Palms grown under a moderate soil moisture program were irrigated 10–12 times between January and September, while those under a low soil moisture program were irrigated moderately during the winter and early spring and then only in May and July, which reduced the rate of elongation of the spike leaf from 10 to 25%. The low soil moisture treatment significantly reduced growth of the palm stem but did not influence production of leaves or inflorescences. Changing leaf-bunch ratios from 10–12 : 1 to 22–26 : 1 produced no differences in shrivel or rain damage. Poor sets of fruit significantly increased shrivel in one year. Shrivel occurred most severely in years when extreme rain damage occurred, which suggests that it is produced by some internal moisture relationships induced by high atmospheric moisture. This situation may be specific with the Maktoom variety. [From authors' summary.]—Univ. Ariz., Tucson.

804. FURR, J. R., AND ARMSTRONG, W. W., JR.
Nitrogen fertilization of dates—a review and progress report.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 6-9, bibl. 5.

Nitrogen fertilization of dates on an N-deficient soil does not immediately increase yield, because, apparently, an appreciable increase in number of inflorescences produced requires more than one year. The total N in the top 8 feet in date-garden and adjacent soils varied from about 2,000 lb. per acre in some sands to about 15,000 lb. per acre in some loams, and heavy fertilization of the cultivated soils for years had resulted in little increase in their total N content except in the top foot. In 3 trials carried out on soils varying from fine sand to very fine sandy loam, annual additions of 6 to 8 lb. N per tree resulted in increased growth and inflorescence production. In 2 trials on loam soils trees fertilized annually with 3 to 8 lb. N for 5 years showed no greater growth or yield than unfertilized trees. The results of this work show that the light sandy soils are low in total N and that unfertilized dates on these soils soon suffer N deficiency. [From authors' summary.]—U.S. Date Field Stat., Indio, Calif.

805. WERTHEIMER, M.
La pollination du palmier-dattier (*Phoenix dactylifera*). **(Pollination of the date palm (*Phoenix dactylifera*).**
Fruits d'Outre Mer, 1957, **12**: 305-13, bibl. 2, illus.

Information is given on the production of inflorescences and of pollen by male palms and on the duration of receptivity of female flowers, and new methods of artificial pollination are described. The bulk of the pollen is collected by hand cutting freshly matured male inflorescences and shaking them in a drawer with a zinc trough fixed to the fine metal gauze base. Remaining pollen is shaken out after a few days' drying of the separated spikes. It is spread in very thin layers on flat slabs and kept dry until needed. The pollinating apparatus consists of a light-weight metal tube 3 cm. in diameter, 1 mm. thick, rigidly assembled in lengths of 2 m. by pushing one end over another and fixed to a hand-operated duster by 1·5 m. of flexible tubing. Two workers are required and a high degree of precision is possible. In dry, still weather a single liberal application in the crown of the palm is sufficient, but each female inflorescence can be pollinated individually if necessary. The main advantages of this over the traditional method are reduction of cost and avoidance of damage to palms from repeated climbing.—Stat. exp. agric. Aïn ben Noui, Biskra.

806. NIXON, R. W.
Effect of age and number of leaves on fruit production of the date palm.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 21-4, bibl. 5.

After they are a year old the value of date leaves for fruit production and palm growth gradually declines. The photosynthetic efficiency of the leaves declined after the first year, so that 4-year-old leaves were only about 65% as efficient per unit area as 1-year-old leaves. The leaves nearer the fruit stalk are more valuable for fruit production than those further away. The size and number of leaves that a palm produces are a reliable index of its productive capacity. [See also *H.A.*, 27: 809.]

807. RYGG, G. L.
The relation of moisture content to rate of darkening in Deglet Noor dates.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 12-13, bibl. 1, illus.

The results suggest that so far as darkening is concerned dates with 24, 22, 20, and 18% moisture may be stored for as long as 1, 2, 4, and 6 months respectively at 75° F. At 40° F., the maximum storage period for dates with 28% moisture in 1955 was 3 months, whereas those with 26% moisture or less could be held for 12 months. Moist dates stored at 40° F. darkened sooner in 1954 than in 1955. [From author's summary. For earlier work see *H.A.*, 27: 815.]—Agric. Mktg Serv., Pomona, Calif.

808. ANSELME, C., AND BALTZAKIS, N.
Sur une pourriture des dattes de conservation provoquée par *Mauginiella scaettae* Cav. (**A storage rot of dates caused by *Mauginiella scaettae*.**)
Ann. Épiphyt., 1957, **8**: 153-64, bibl. 4, illus.

Heat treatment at temperatures up to 120° C. failed to kill spore masses on dates, but immersion of the dates for ¼ hr in alcohol at 95° C. before packing eliminated every trace of the fungus.

809. DOWSON, V. H. W.
Palm wine in Libya.
Trop. Agriculture, Trin., 1957, **34**: 295-309, bibl. 41, illus.

The stems, but not the spathes, of date palms are widely tapped in North Africa to yield a sweet sap called *lagbi*, which contains about 10% sucrose and from which an alcoholic drink tasting rather like a "John Collins", is made. The methods used, costs, and legislation controlling the practice are described. Among date varieties the Taabuuni is considered to yield the greatest amount of *lagbi* and next come male palms. About 5% of the palms tapped may die. The same palm is not usually tapped more than 2 or 3 times in its life. Tapping in summer yields much more sap than tapping in winter.—F.A.O. Mission, Tripoli, Libya.

Litchis.

(*See also* 825.)

810. MUKERJEE, P. K.
Preservation of natural colour in litchies under cold storage.
Sci. and Cult., 1957, **23**: 101-3, bibl. 1.

Litchi fruits packed in polythene bags with paper shavings or cotton packings were satisfactorily stored at 40° F. for 4 weeks and retained their natural colour. Kraft paper bags, cloth bags and baskets were unsatisfactory as storage containers.—Govt. Fruit Res. Stat., Saharanpur, U.P.

Macadamias.

811. NAMBA, R.
A native Hawaiian caterpillar pest of macadamia.
Hawaii Fm Sci., 1957, **6**(1): 4, illus.

The life history and symptoms caused by *Cryptophlebia illepida* are described. Cultural control measures recommended include removal of alternate host species (especially *Acacia koa*), selection of varieties fruiting at the same time, and removing fallen fruits from the orchard at 7-day intervals.

Olives.

(*See also* 63, 234, 789, 822e.)

812. ORTEGA NIETO, J. M.
Fertilización nitrogenada mineral y orgánica de abono verde en el olivo. (**Nitrogen manuring of olive trees with mineral fertilizers and green manures.**)
[*Publ.*] *Inst. nac. Invest. agron. Madrid*, 1957, pp. 20, bibl. 7, illus.

Ammonium sulphate at 2 kg. per tree, applied annually in February, gave an average yield increase of 22% over a 13-year period, but tended to reduce yields after drought. Vetches, sown at 80–90 kg. of seed per ha. (after applying P and K) and used as green manure, gave approximately 25% yield increase over 11 years and considerably improved soil moisture conditions. Mineral N at more than 200 g. per tree was uneconomic.

813. ANON.
Spray thinning for olives.
West. Fruit Gr, 1957, **11**(4): 52-3.

In a year of heavy fruit set experimental thinning with NAA in Californian olive groves gave very satisfactory results. The sprayed trees produced large, good quality fruit suitable for canning, whereas the untreated trees produced heavy crops of small olives suitable only for oil extraction. Thinning also ensured a good crop the following year. It is recommended that the spray should contain 150 p.p.m. NAA plus a wetting agent, and that it should be applied 1 week after 90% petal fall.

814. BELTRÁ, R.
El agente etiológico de la tuberculosis de olivo en relación con el suelo. (**The causal agent of olive tuberculosis in relation to the soil.**) [English summary ½ p.]
An. Edafol. Fisiol. veg., 1957, **16**: 557-77, bibl. 11.

Detailed studies of 10 olive soils showed that *Pseudomonas savastanoi* was destroyed by dense compaction and favoured by a pH range of 6·4–8·45. On such soils only varieties highly resistant to tuberculosis should be planted. The soil least favourable to the pathogen, in spite of its pH of 7·5, was a clayey sand which has little free moisture. The olive varieties Manzanilla, Arbequina and Lechin, though susceptible, could be grown on such soil without much risk.

815. Buchmann, E., and Müller, O.
Das Tonbandgerät im Dienste des Olivenbaues in Nordafrika. **(A tape-recorder in the service of olive growing in North Africa.)**
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 575-80, bibl. 1, illus.

In Tunisia in the season 1955/56 starlings are estimated to have destroyed 700 tons of olives. In 1956/57 trials were carried out on broadcasting danger cries. Losses were much reduced and it is estimated that on a national scale they would only have amounted to 150 tons.

Passion fruit.

See 822p.

Persimmons.

816. Mezzetti, A.
Defogliazione o giallume latente del kaki, con particolare riguardo alla sua epidemiologia. Terzo contributo. **(Defoliation or latent yellows of persimmon, with special reference to its epidemiology. Third contribution.)** [English summary ¾ p.]
Ann. Sper. agrar., 1957, **11**: 959-77, bibl. 14, illus.

Symptoms were enhanced and the disease became malignant in trees infested with bark-destroying insects or growing in poor soils with excess or deficiency of moisture. Some young trees growing under favourable conditions recovered spontaneously, others under adverse conditions were partially or completely cured by fairly drastic pruning, accompanied by liberal N fertilizing and improved soil drainage. Some, but not all of the symptoms, were induced by ringing branches. The *lycopersicum* type of *D. kaki* was particularly susceptible. The virus nature of the disease has not been confirmed, but seems highly probable.—Lab. sper. Pat. veg., Bologna.

817. Okazaki, M., and Koike, M.
Studies on the gas-storage of kaki fruits (*Diospyros kaki* Linn. f.). [Japanese, with English summary 1 p.]
Sci. Rep. Fac. Agric. Okayama Univ., 1957, No. 10, pp. 69-76, bibl. 8.

Experiments during 1953 and 1955 showed that from mid-September until early November Fuyu persimmon fruits produced decreasing amounts of CO_2, but that after the minimum was reached on 4 November the amount of CO_2 evolved increased again. The effects of storage in vacuum desiccators, with and without the CO_2 removed, on firmness and browning are reported. J.R.L.

818. Matsui, S., and others.
The relationship between the chemical constituents and quality of dried persimmons. (2) The relationship between harvest time and quality. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **26**: 105-10, bibl. 1.

Delayed harvesting of persimmon fruits caused fruit softening and increased the total sugar content in two varieties. The crude fibre content tended to decrease. The ratio between water soluble pectin and total pectin content was not affected by harvest time. The composition of fruits harvested in early November differed little in composition whether they were sun-dried or dehydrated.

Tung.

(*See also* 822q.)

819. Bonnet, P., and Vidal, P.
Les abrasins en Guinée forestière. **(Tung in the forests of Guinea.)**
J. Agric. trop. Bot. appl., 1957, **4**: 53-68, bibl. 6, illus.

Progress in establishing *Aleurites montana* is described. Observations are included on seed germination, planting, growth, rhythm and sex distribution in flowering, yields, selection, grafting (side grafts were better than shield budding), artificial pollination and technology.—Stat. exp. Quinquina, Serédou, French Guinea.

820. Lagassé, F. S., and others.
U.S. Field Laboratory for Tung Investigations.
A.R. Fla agric. Exp. Stats, 1955-56, pp. 108-10.

Nutritional studies: An investigation on the effect of a bermuda grass cover on young tung trees suggest that one of the detrimental effects of weeds on growth may be reduced soil aeration. In experiments with varying nutrient levels increased yields were obtained at high levels of 2 or more of the nutrients N, K or Mg; high levels of K, Ca and Mg, when applied with high ammonium nitrate, gave the best yields in the experiment. In another experiment involving 3 levels each of N, K and Mg, 2 levels of Zn and 2 sources of N were applied in the sub-plots; leaf Zn was 0·107 me./100 g. when nitrate was used and 0·152 me./100 g., when ammonia was applied; high N as nitrate increased leaf N from 407 to 496 me./100 g., while high ammonia increased it from 428 to 462 me./100 g.; leaf K was increased by high K treatment and reduced by high N; high nitrate N resulted in a significant increase in leaf Mg, while high K resulted in a decrease. In a third experiment involving N, K, Ca and Mg, N source and K level significantly affected the incidence of *Cercospora*; high N, especially urea, increased it and high K reduced it.

821. Raymond, W. D., and Ward, J. B.
***Aleurites montana* nuts from Nyasaland.**
Colon. Plant Anim. Prod., 1956 (issued 1957), **6**: 120-6, bibl. 4.

Samples of nuts from 10 clones were examined. Few proved capable of yielding a solvent-extracted oil with a gelation time of less than 26 minutes, which is the maximum time allowed for the heat test. Clones C2A, N24 and O4 combined satisfactory heat-test performances with good contents of elaeostearic acid. Further work is in progress in an effort to explain the poor performance of Nyasaland tung oils in the heat test.

Noted.

822.

a Ali, N.
Some aspects of rootstock raising technique at Lyallpur.
Punjab Fruit J., 1957, **21**: 22-5.
Recommendations for citrus nurseries.

b Aschmann, H.
The introduction of date palms into Baja California.
Econ. Bot., 1957, **11**: 174-7, bibl. 10, illus.
Historical review.

c Avron (Abramsky), M., and Biale, J. B.
Metabolic processes in cytoplasmic particles of the avocado fruit. III. The operation of the tricarboxylic acid cycle.
Plant Physiol., 1957, **32**: 100-5, bibl. 34.

d Avron (Abramsky), M., and Biale, J. B.
Metabolic processes in cytoplasmic particles of the avocado fruit. V. Effect of oxalacetate on the oxidation of pyruvate and succinate.
J. biol. Chem., 1957, **225**: 699-708, bibl. 16.

e Baldini, E.
Contributo allo studio delle cultivar toscane di olivo. Indagini condotte in provincia di Pistoia. Parte I. **(Contribution to the study of Tuscan varieties of olive. Investigations in the province of Pistoia. Part I.)** [English summary ¼ p.]
Ann. Sper. agrar., 1957, Vol. **11**, No. 4, *Suppl.* pp. CXLV-CLXX, illus.
Details of 22 varieties, including pollen compatibility.

f Biale, J. B., and others.
Metabolic processes in cytoplasmic particles of the avocado fruit. I. Preparative procedure, cofactor requirements, and oxidative phosphorylation.
Physiol. Plant., 1957, **10**: 48-63, bibl. 31.

g Botham, J. R.
South Australian horticultural branch's report of citrus work in progress, March 1957.
Citrus News, 1957, 33: 56-7.
On nutrition, irrigation, pests, diseases, storage and rootstocks.

h Brendl, O., Jr.
Die Obstgartenwirtschaft Ägyptens. **(Fruit growing in Egypt.)**
Bodenkultur, 1957, **9**: 469-87, bibl. 37.
Citrus, bananas, figs, grapes, mangoes, etc.

i Brown, T. R.
Twenty year bunch production record of individual Deglet Noor date palms.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 19-20.
Detailed records from a commercial garden.

j Burger, J. J.
Why a power spraying machine?
Citrus Gr, 1957, No. 284, pp. 1, 3-8, bibl. 2, illus.
High-volume equipment and its use for citrus in S. Africa discussed.

k Chow, C. T., and Biale, J. B.
Metabolic processes in cytoplasmic particles of the avocado fruit. II. Participation of cytochrome c in the electron transport chain.
Physiol. Plant., 1957, **10**: 64-75, bibl. 18.

l Cranfield, W.
Some results obtained from "ringing" citrus trees.
Punjab Fruit J., 1957, **21**: 11-12.
Yields increased the first year, but reduced the second.

m Darley, E. F., and Zentmyer, G. A.
Oak root fungus on avocados.
Yearb. Calif. Avoc. Soc. for 1957, pp. 80-1.
The avocado is resistant or tolerant, but not immune to *Armillaria mellea.*

n Durbin, R. D., Frolich, E. F., and Zentmyer, G. A.
Eradication of *Phytophthora cinnamomi* in avocado seed by hot water treatment.
Yearb. Calif. Avoc. Soc. for 1957, pp. 141-2, bibl. 5.
Hot water treatment of avocado seed to eradicate root rot.
Calif. Citrogr., 1957, **43**: 39-40, bibl. 8.
Same work noted *H.A.*, 27: 3892i.

o Feder, W. A., Feldmesser, J., and Walkinshaw, C. H., Jr.
Microorganisms isolated from feeder roots of citrus seedlings affected by spreading decline.
Proc. Soil Crop Sci. Soc. Fla 1956, 1957, **16**: 127-9, bibl. 14.
A fungus-nematode complex is a possibility.

p Jaramillo J., A.
Primeros resultados de un ensayo sobre el cultivo de la curuba (*Passiflora* spp.). **(Preliminary results of a trial on the culture of *Passiflora* spp.)**
Agric. trop. Bogotá, 1957, **13**: 301-8, illus.
Methods and economics of culture on a farm in Colombia.

q Kilby, W. W., and Jezek, R. E.
Machinery in tung orchard management.
Miss. Fm Res., 1957, **20**(2): 3-6, bibl. 2, illus.
Machines available for planting, fertilization, cultivation and harvesting discussed.

r McClean, A. P. D.
Virus infections in citrus trees.
FAO Plant Prot. Bull., 1957, **5**: 133-41, bibl. 36.
A review.

s Munier, P.
Le palmier-dattier en Espagne continentale. **(The date palm in Spain.)**
Fruits d'Outre Mer, 1957, **6**: 269-76, bibl. 6, illus.
Including production of blanched palm leaves and fibre.

t Nixon, R. W.
Experimental planting of imported varieties of dates in the San Joaquin Valley of California.
Rep. 34th annu. Date Grs' Inst., Coachella, 1957, pp. 15-16.
Details given of the behaviour of 17 varieties.

u Nogueira, D.
A citricultura no concelho de Vidigueira. Aspectos económicos. **(Citrus growing in the Vidiguera district. Economic aspects.)** [French and English summaries 1 p. each.]
Bol. Junta nac. Frut. Lisbon, 1954, **14**: 29-91, bibl. 25, map.

v Philippe, J.
Programme et calendrier de pulvérisations des agrumes. **(Programme and calendar for spraying citrus.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 259-60, bibl. 1.
For use in the Belgian Congo against fungi and pests.

w Powell, L. A., Sr, and Godwin, M. R.
Economic relationships involved in retailing citrus products.
Tech. Bull. Fla agric. Exp. Stats **567**, 1955, pp. 87, bibl. few in text, [received 1957].
Including fresh fruit comparisons between citrus and apples.

x Reichert, I., and Bental, A.
Decline of Satsuma mandarin oranges in Israel.
FAO Plant Prot. Bull., 1957, **5**: 156-8, bibl. 10, illus.
Tests show xyloporosis, and not tristeza, to be responsible.

y Schneider, H.
Anatomical response of some citrus species to tristeza virus.
From abstr. in *Phytopathology*, 1957, **47**: 534.

z Schneider, H.
Chromatic parenchyma cells in tristeza-diseased citrus.
From abstr. in *Phytopathology*, 1957, **47**: 533-4.

823.

a Smith, A. F. G.
Programme of operations for Natal citrus growers.
Citrus Gr, 1957, No. 281, pp. 5-6, 8.
Pest, disease and maturity spray programmes, manuring, irrigation and packing house treatments.

b Stewart, I., and Leonard, C. D.
Use of chelates in citrus production in Florida.
Soil Sci., 1957, **84**: 87-97, bibl. 15.
A review of recent work on chelates on Fe and Zn.

c Stumpf, P. K., and Barber, G. A.
Fat metabolism in higher plants. IX. Enzymic synthesis of long chain fatty acids by avocado particles.
J. biol. Chem., 1957, **227**: 407-17, bibl. 21.
Providing evidence on the mechanism of fatty acid formation in avocado fruits.

d Tachikawa, T.
Differences in resistance of citrus trees and some other plants to salt-laden air. [Japanese, with English summary ½ p.]
Bull. Citrus Exp. Stat., Shizuoka, 1956, No. 2, pp. 24-39, bibl. 3.
Injury suffered by many species following typhoon.

e U.S. Dep. Agric., Foreign Agricultural Service.
World citrus production, 1956.
Foreign Agric. Circ. **FCF3-57**, 1957, pp. 8.

f de Vasconellos, P. W. C.
Algumas observacões sôbre adubacões de citrus. II. Influências no potencial hidrogênio do solo. **(Some observations on manuring citrus. II. Effects on the hydrogen-ion potential of the soil.)**
Rev. Agric. Piracicaba, 1957, **32**: 83-90.
20 years' differential fertilizer treatments affected pH only slightly.

g Zentmyer, G. A.
Prevention of *Phytophthora* root rot development in new plantings, and other phases of root rot research.
Yearb. Calif. Avoc. Soc. for 1957, pp. 55-7.
Including notes on research in progress.

h Zentmyer, G. A.
The search for resistant rootstocks in Latin America.
Yearb. Calif. Avoc. Soc. for 1957, pp. 101-6.
Persea spp. collected in 1956, with particular reference to resistance to *Phytophthora cinnamomi*.

TROPICAL FRUIT AND PLANTATION CROPS

General.

(*See also* 12, 71, 359-370, 959n, u, 982, 988, 996, 1009, 1011, 1015c, e-h, l, m, o, p.)

824. Campbell, J. S.
Some observations on the fruit trees of Trinidad.
J. agric. Soc. Trin. Tob., 1957, **57**: 209-23.

Numerous trees and shrubs bearing edible fruits and nuts are grown in Trinidad, a few commercially, many as backyard trees and some only in the Botanic Gardens. These are listed under common and botanical names, together with such information as flowering and cropping periods, time taken to reach maturity, planting distances in some cases, and methods of propagation.—Imp. Coll. trop. Agric.

825. Lange, A. H.
Gibberellins—new plant growth regulators.
Hawaii Fm Sci., 1957, **6**(1): 10, illus.

Young seedlings of papaw, guava, coffee, banana, citrus and passion fruit have increased in growth, by as much as 35% in fresh weight and 80% in height, following treatment with 10 and 100 p.p.m. gibberellic acid. Avocado, litchi, mango and macadamia nut seedlings showed no noticeable response. Germination of papaw seeds was greatly accelerated at concentrations of 1, 10, 100 and 1,000 p.p.m. gibberellic acid.

826. Kearns, H. G. H., and Morgan, N. G.
Spray application problems: XXXIX. A general purpose lance for use with power spray machinery on tropical crops.
A.R. Long Ashton agric. hort. Res. Stat. 1956, 1957, pp. 151-3, bibl. 1, illus.

A spray lance for use by unskilled labour on tropical crops is described. The nozzle assembly incorporates a large filter, the lance is lined with corrosion-resistant polyvinyl chloride and the tap is of simple robust design. All the components requiring cleaning can be removed by hand without the use of spanners. [Authors' summary.]

827. Templa, M. A., and Quimosing, N.
Furfural content of some Philippine agricultural residues.
Philipp. J. Sci., 1956 (issued 1957), **85**: 417-24, bibl. 9.

Among crop residues found to contain relatively high furfural contents were coconut shells (16·2% moisture-free basis), coffee-bean inner husks (10·28–11·70%), pili nut [*Canarium ovatum*] shells (13·45%) and sugar cane bagasse (15·51%).

Bananas.

(*See also* 163, 959e, g, h.)

828. Shepherd, K.
Banana cultivars in East Africa.
Trop. Agriculture, Trin., 1957, **34**: 277-86, bibl. 8.

Fifty-one East African banana clones were grown and compared with each other and with a standard collection at the Imperial College of Tropical Agriculture. The results are made the basis for an analysis of the number of cultivars and their distribution in East Africa. There are probably not more than 55 cultivars in East Africa all told; a majority of them are types (diploid and triploid) that originated from *Musa acuminata*, and very few of them are yet known outside East Africa. Other types (of hybrid origin) show signs of being of more recent introduction to the continent; they are all well known and widely distributed outside Africa. Somatic mutation has contributed much to diversity. [Author's summary.]

829. Navarre, E.
Multiplication des *Musa* à feuilles rouges.
(Propagation of the red-leaved banana.)
Rev. hort. Paris, 1957, **129**: 1712, illus.

A rhizome of the ornamental *Musa maurelii* was cut horizontally just below the growing point, and kept in a propagating case with bottom heat. Numerous suckers developed rapidly, and after 2 months 66 were large enough to remove and in little more than 3 months the total had risen to 187. Detaching the small suckers without damaging their roots required care and the use of a well aerated potting medium was necessary to prevent the development of rots.

830. Bhan, K. C., and Majumdar, P. K.
Manurial investigations with banana (Martaman variety) in West Bengal.
Indian J. agric. Sci., 1956, **26**: 337-50, bibl. 12.

In a 3-year replicated experiment on a new banana plantation N fertilizers (as cow dung, mustard cake and/or ammonium sulphate), superphosphate and sulphate of potash were applied at various rates and in various combinations. Ammonium sulphate+cow dung produced better initial growth than cow dung+mustard cake, but the difference later became insignificant. The growth response to low applications of N plus heavy applications of P, with or without K, was poor. The plants cropped earlier and yielded better when heavy applications of N were used, but did not respond to P or K. Heavy N applications also had a significant effect on the number of hands and fingers per bunch.

K added to a low basal application of N also increased the number of fingers up to the level of that produced by plants receiving heavy applications of N. —Banana Res. Scheme, W. Bengal, Chinsura, Hooghly.
J.R.L.

831. Mobbs, J. A.
Propping methods in the banana plantation.
Qd agric. J., 1957, **83**: 177-80, illus.

Fruit branches of Mons Mari and Cavendish, but not normally of Lady Finger, need to be propped. Single props are not satisfactory; a double prop joined a few inches from the end by a bolt or a short length of wire netting is most economical. In areas where cyclones occur the bunches can be roped to a wire fixed to posts at the ends of the rows. J.R.L.

832. Kearns, H. G. H., and Martin, J. T.
Spray application problems: XXXV. The control of leaf spot disease *(Mycosphaerella musicola)* on Lacatan bananas. The levels and distribution of bordeaux mixture deposits.
A.R. Long Ashton agric. hort. Res. Stat. 1956, 1957, pp. 135-41, bibl. 4, illus.

A comprehensive series of trials carried out in the West Indies from 1952–55 to determine the levels and distribution of copper fungicides on banana leaves are here described. Results are summarized thus: A description is given of the spraying requirements for the control of the ascospore infections of the leaf spot disease on the Lacatan variety of banana by means of bordeaux mixture. The levels and distribution of deposits of bordeaux mixture used with and without wetters were determined.

833. Leach, R.
Helicopter spraying of bananas.
Commonw. phytopath. News, 1957, **3**: 44.

Esso Orchard Spray Oil was applied at 2 gal./acre to Lacatan bananas heavily infected by ascospores of leaf spot disease (*Mycosphaerella musicola*) by (a) a Hiller helicopter and (b) a Motoblo mechanical knapsack mist-sprayer. Compared with an unsprayed plot the oil applied by both methods gave an excellent and very similar degree of control.—Banana Bd, Kingston, Jamaica.

834. Pont, W.
Progress in banana leaf spot control in North Queensland.
Qd agric. J., 1957, **83**: 317-26, illus.

In an experiment the control of leaf spot obtained by sprays of bordeaux mixture+white oil+malachite green was superior to that obtained with bordeaux mixture with wetting agents, stickers or urea. There was evidence that the mixture possessed fungistatic properties. In a second experiment, in which oil-based copper oxychloride was applied, both misting and fogging gave good control. Weekly applications proved better than fortnightly ones. Although misting and fogging were both more costly than conventional spraying, an acre could be treated in less than an hour compared with the 7–8 hours needed for high volume spraying. J.R.L.

835. Cevallos, M. A.
El caterpilar del banano. **(The banana caterpillar.)**
Cienc. Nat., 1957, **1**(1): 13-14.

The larvae of the moth *Ceramidia viridis*, voracious feeders on banana leaves, are controlled by foliar sprays of emulsions of DDT or toxaphene applied at the beginning of the rainy season. The former is miscible with fungicides used to control leaf spot disease.

836. Castellani, E.
Su alcune malattie da trasporto delle banane. **(Some transport diseases of bananas.)**
Progr. agric. Bologna, 1957, 3: 674-80, illus.

The effects of rainfall and temperature on the incidence of *Gloeosporium musarum* in bananas harvested at 10-day intervals in Italian Somaliland are analysed. The importance is emphasized of prolonging the preclimacteric state until the end of the sea voyage, since the fungus remains dormant until active conversion of starch to sugar has begun in the fruit. Graphs indicate rates of transformation of starch to sugar during 15 days' transport under good, moderate and bad conditions and during subsequent storage for varying periods at different temperatures.

837. Seshagiri, P. V. V., and Bhiravamurty, P. V.
Physiological studies in the banana "Thellachakrakeli".
Curr. Sci., 1957, **26**: 216-17, bibl. 5.

A preliminary account is given of experiments which have shown that storage in 10 and 20% CO_2/air mixtures increased the storage life of this banana variety by 5–7 days at 30° C. and by 9–10 days at 10° C. Chromatograms showed that the malic acid content of the fruits increased with increasing concentration of CO_2 and with length of time in storage.—Andhra Univ., Waltair. J.R.L.

838. Tager, J. M., and Biale, J. B.
Carboxylase and aldolase activity in the ripening banana.
Physiol. Plant., 1957, **10**: 79-85, bibl. 20.

The enzymes carboxylase and aldolase appear to be absent from the pulp of the preclimacteric banana fruit. Both enzymes make their appearance during the climacteric and increase in activity until several days after the climacteric peak has been reached. [Authors' summary.]—Univ. Calif., Los Angeles.

839. Dupaigne, P.
Essai de dessiccation de fruits. **(Experiment in fruit drying.)**
Fruits d'Outre Mer, 1957, **12**: 317-23, bibl. 38, illus.

A drying kiln for bananas is described. Temperature and speed of the air passing through it can be registered and regulated and thus adapted for drying other fruits. Various substances were tested for preventing browning of bananas by oxidation during drying: the only one giving satisfactory results was sulphur dioxide, which was more convenient in solution than in gaseous form. Pineapples were sliced and dried in 5–6 hours, but whole bananas required nearly 10 hours. Materials for packaging are discussed.

Cacao.

(*See also* 959b, l, r, w, 960d, e, j, m, 961d, 1004.)

840. Urquhart, D. H.
Report on the cocoa industry in the French Ivory Coast.
Report on the cocoa industry in Sierra Leone and notes on the cocoa industry of the Gold Coast.
Notes on cocoa in some countries of south east Asia and the Pacific.
Report on the expansion of the cocoa industry in Jamaica.
Wood, G. A. R.
Report on cocoa growing in the Dominican Republic, Mexico, Guatemala and Costa Rica.
[*Publs*] *Cadbury Bros., Bournville*, 1955, pp. 32 and pp. 43, and 1957, pp. 38, pp. 27 and pp. 40, all with maps, illus., 5s.

These reports give a general picture of the cacao industries in the countries in question, covering such aspects as the regional distribution of cacao, climatic conditions, types of cacao grown, cultural methods, pests and diseases and methods of preparing and grading the beans. Future prospects are also discussed, and in some cases suggestions are made for improving methods of production. Maps and photographs are a prominent feature of each publication.

841. BARTLEY, B. G. D., AND COPE, F. W.
Some early observations on seedling progenies.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 7-8, bibl. 1.

The early yields of progeny derived from selfed ICS clones and from crosses involving Criollo parentage have been poor. Similarly, the early yields of cuttings of the clones ICS 1, 6 and 8 have been much better than those of seedlings derived from crosses between them. By contrast, hybrids between 3 ICS clones and the witches' broom-resistant Upper Amazon clones SCA (Scavina) 6 and SCA 12 have shown outstanding precocity and have yielded from 1,086 to 1,504 lb. dry cocoa at 4 years. So far the hybrids have shown no vegetative infection by witches' broom. Their beans, however, are small and have not yet been tested for flavour.

842. MONTSERIN, B. G., DE VERTEUIL, L. L., AND FREEMAN, W. E.
A note on cocoa hybridisation in Trinidad with reference to clonal selection and hybrid seed.
J. agric. Soc. Trin. Tob., 1957, **57**: 19-27.

When SCA 6 was used as a parent a very high proportion of the trees in the seedling populations had beans with dry weights exceeding 1 g. The highest percentage of trees immune to witches' broom was produced by the cross SCA 6×IMC 67. The immune character of SCA 6 was more pronounced in progeny from crosses in which SCA 6 was the female parent than when it was used as the male parent. The early-bearing, high-yielding seedling population obtained by the controlled crosses suggests the possible use of hybrid seed from selected parents as a source of planting material.

843. MURRAY, D. B., AND BRIDGE, C. J. R.
A comparison of various methods of rooting cacao cuttings.
Rep. Cacao Res. I.C.T.A., 1955-1956, 1957, pp. 41-4, bibl. 4.

A comparison is made of 7 different techniques for rooting and establishing cacao cuttings. All methods are capable of giving comparable figures of 75–80% established plants if operated efficiently. The cost of production by the cheapest method is about 25% below that of the most expensive method.

844. MCKELVIE, A. D.
The polythene sheet method of rooting cacao cuttings.
Trop. Agriculture, Trin., 1957, **34**: 260-5, bibl. 6, illus.

A method of rooting cacao cuttings in baskets under polythene sheet is described. It is almost 100% successful and is much cheaper than existing methods. It economizes on materials and labour and can be applied to small scale farming or to large plantations. [Author's summary.]—W.A.C.R.I.

845. BURLE, L.
Note sur une nouvelle methode de bouturage de cacaoyer. **(A note on a new method of propagating cacao by cuttings.)**
Bull. Centre Rech. agron. Bingerville, 1955, No. 10, pp. 43-8, bibl. 3, illus., [received 1957].

Cacao cuttings were successfully rooted in basket pots containing a central core of rooting medium, placed on shelves in a shaded glasshouse (10 m.× 3·6 m.×2·5 m.) with a humidifier. The mist was operated daily from 7 a.m. to 6 p.m. except during rain, and rooting took place in 20 to 25 days. The rooted cuttings were hardened off under lathe shade structures. [For an account of the original method developed in Trinidad see *H.A.*, 25: 2118.]

846. FENNAH, R. G.
An analysis of yield variation in a sample of cacao trees.
Rep. Cacao Res. I.C.T.A., 1955-1956, 1957, pp. 9-20, bibl. 3.

An analysis is made of the yields of 6 samples of cacao trees over a period of years. The samples include 5 pickets [trees, or, more literally, tree sites] each of two high-yielding clones and of one relatively low-yielding clone, and 3 sets of 9 pickets from a high yielding area. The yield variation, after an initial period of about 4 years, normally comprises 2 elements, an increase in age and a multiple correlation with rainfall. Differences in the rate of yield-increase with age are attributed to an interaction between fertility of the site and the length of time in each year for which the tree can make unimpeded growth. Differences in the type of correlation between yield pattern and rainfall are attributed to an interaction between rainfall and soil at the site, with special reference to its water-retaining capacity and to the effect of different soil moisture levels on utilization by the tree of nutrient elements. A general scheme is formulated in which the position of pickets of each correlation group with regard to the effects of water deficiency and water excess is shown in relation to the range of annual rainfall values recorded in this field. The yield variation, which remains after the effect of yield increase with age and relationship with annual rainfall have been deducted, showed a correlation with rainfall of the dry season immediately preceding the crop season. This correlation is positive in the group with yields positively correlated with annual rainfall, and negative in the contrasting group. Further residual variation in annual yield after the preceding correlation has been allowed for, in the group with yields positively correlated with rainfall, shows, firstly, a positive correlation with September rainfall during the crop season in reference, and secondly, if a correction is applied to the data, a positive correlation with rainfall in July and August. The residual variation in annual yield in the group with yields negatively correlated with rainfall, when corrected to offset a buffering effect of increasing magnitude with age, is found to be almost perfectly correlated with rainfall from the beginning of December to the end of March in the corresponding crop season. [Author's summary.]

847. Murray, D. B.
Deficiency levels of the major nutrients in cacao leaves.
Rep. Cacao Res. I.C.T.A., 1955-1956, 1957, pp. 21-2, bibl. 2.

Cacao plants were grown in complete nutrient culture and in cultures minus N, P, K, Ca and Mg, and their leaves analysed for the same elements. The results are expressed as absolute values and also in terms of general nutrient balance as revealed by ratios between the various elements and the sums of bases accumulated. The latter method reveals antagonisms which give more information about nutrient deficiencies than do single figures for the level of any particular nutrient. However, in field experiments, where the range of nutrient levels is much smaller and the ratios are therefore much closer, sampling technique remains a major problem.

848. Jones, T. A., Havord, G., and Maliphant, G. K.
Nutrient uptake by excised cacao roots—a micro technique.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 23-6, bibl. 5.

The ability of white roots, when excised, to function in a manner similar to roots attached to the trees is a positive indication that the root sample is still capable of acting as a living organism. Results of absorption by roots in sand culture clearly demonstrated the known deficiencies in the nutrient solutions, particularly deficiencies of N, P and K, but results for Mg were less satisfactory owing to the limitations of the analytical procedure. Results of absorption by roots from field plots in some cases showed good agreement with field treatments. Thus roots from trees not receiving P fertilizer absorbed significantly more P than roots of trees which had received P. [From authors' discussion.]

849. Nichols, R.
The growth substances of *Theobroma cacao*. I.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 33-40, bibl. 22.

Three growth substances have been detected in cacao, an acidic accelerator (cacao auxin I) similar in Rf characteristics but not identical to IAA, a neutral accelerator (cacao auxin II) and an acidic inhibitor. A tentative hypothesis is suggested for the interrelation between growth substances in the ovules and pod wilting. [From author's summary.]

850. Nichols, R.
A note on the effect of maleic hydrazide sprays on cacao seedlings and cuttings.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, p. 53.

The results of further work are similar to those reported previously [*H.A.*, 26: 1114], except that rooted cuttings were found to produce narrow twisted leaves when sprayed with 0·1% MH. Consistent loss of apical dominance was not found in seedlings. No positive correlation was found between MH spray treatments and flushing behaviour.

851. Holden, M.
An investigation on polyphenolic compounds of the cacao leaf in connexion with a chemical method for detecting virus infection.
J. Sci. Food Agric., 1957, **8**: 553-61, bibl. 22.

Polyphenolic substances in acid extracts of cacao leaves have been separated by paper partition chromatography. The substance which gives a red colour when cacao leaf extracts are heated with alkali, a reaction which has been used as the basis of a "colour-test" for detecting infection with swollen shoot virus, has the properties of a *leuco*-anthocyanin. The amount of red-producing *leuco*-anthocyanin varies with the total tannin content of the leaf. In addition to virus infection, other factors such as age of leaf and variety of cacao, which affect the total tannin content, also affect the *leuco*-anthocyanin content. The bearing of this on the applicability of the "colour-test" is discussed. [Author's abstract.]—W.A.C.R.I.

852. Cornwell, P. B.
An investigation into the effect of cultural conditions on populations of the vectors of virus diseases of cacao in Ghana with an evaluation of seasonal population trends.
Bull. ent. Res., 1957, **48**: 375-96, bibl. 8.

Differences in environment ranging from dense secondary bush to well-cultivated conditions did not significantly influence the percentage of cacao trees infested by mealybugs or the size of mealybug populations.—W.A.C.R.I.

853. Hanna, A. D., and Heatherington, W.
Arrest of the swollen-shoot virus disease of cacao in the Gold Coast by controlling the mealybug vectors with the systemic insecticide, dimefox.
Ann. appl. Biol., 1957, **45**: 473-80, bibl. 4.

The number of diseased trees decreased very rapidly a year after dimefox had been applied to the soil 9 times and it remained low for the 3 years that the experiment was continued. Chemical treatment combined with cutting out was more efficient than cutting out alone in arresting the advance of the disease. [See also *H.A.*, 27: 858.]

F.W.A.

854. Thorold, C. A.
Spray techniques: black pod control in Nigeria cocoa farms.
Commonw. phytopath. News, 1957, **3**: 33-5, 39, illus.

The encouraging results obtained in the spraying campaign against black pod disease in Nigeria are discussed. At present cacao prices and spraying costs it would appear to be economical to spray relatively bad black-pod areas in which the potential yield is 600 lb. dry cacao per acre. Attempts are being made to reduce spraying costs, which work out at about £17 per acre for 1% carbide-bordeaux applied 12 times a year by conventional hand-operated spray pumps. In a recent trial satisfactory control was obtained with

0·4% Perenox applied by a Motoblo power-operated, knapsack sprayer at £4·1 per acre.

855. Desrosiers, R., and Diaz M., J.
Efecto de diversos fungicidas en el control de la monilia. (**The effect of various fungicides used to control monilia pod rot.**) [English abstract 8 lines.]
Turrialba, 1956, **6**: 19-22.

The following fungicides were tested against *Monilia roreri* on cacao, each in 100 gal. water: wettable sulphur, 10 lb.; Parzate, 2 lb.; Yellow Cuprocide, 1 lb.; Zerlate, 2 lb.; Fermate, 2 lb.; C-O-C-S (basic sulphates and chlorides of copper), 1·5 lb. Spray applications were made at 7–10 day intervals from January to November. Wettable sulphur, Parzate and Yellow Cuprocide gave the best control. Yield increase, compared with the previous year when the trees were not sprayed, was highest (290%) with wettable sulphur, the increase in the controls being only 45%. It is considered that yield increases due to spraying were related not only to monilia control but also to the control of other fungi, epiphytes and possibly pests.—Pichilingue Exp. Stat., Ecuador.

856. Arbeláez Giraldo, E.
La llaga macana del tronco del cacao. (**Macana rot of the cacao trunk.**) [English summary ¾ p.]
Acta agron. Palmira, 1957, 7: 71-103, bibl. 21, illus.

The pathogen was identified as *Ophiostoma fimbriatum* (*Ceratostomella fimbriata*). It enters the host via wounds and is probably spread by the bark beetles *Xyleborus* and *Platypus* spp. No curative treatments are yet known, but prevention must obviously include protection from bark injury. The same fungus attacks coffee, but inflicts less damage than in cacao.

857. Baker, R. E. D., and Holliday, P.
Witches' broom disease of cacao *(Marasmius perniciosus* Stahel).
Phytopath. Pap. Commonw. mycol. Inst. **2**, 1957, pp. 42, bibl. 133, illus., 12s. 6d.

In this comprehensive survey of investigations on witches' broom of cacao the authors deal in turn with its history and distribution; its host range, which is restricted to species of *Theobroma*; its symptoms on cacao and other *Theobroma* species; its effect, often drastic, on yields; the fungus, its life history and stages of development on cacao, and its epidemiology and climatic range; and finally control through sanitary measures, spraying and the selection and development of resistant cacao clones.

858. Holliday, P.
Further observations on the susceptibility of Imperial College selections to witches' broom disease.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 48-53, bibl. 5.

Further examination of ICS clones for susceptibility to witches' broom disease confirms that wide variations exist and that usually those clones most susceptible to pod infection will produce most brooms. A total of 46 clones has now been examined. Clearly the best is ICS 95. [From author's summary.]

859. Malaya Department of Agriculture.
Notes on current investigations and extension work, July to September, 1956, Cacao.
Malay. agric. J., 1956, **39**: 293-4.

Fresh cacao beans chilled at 1° C. prior to fermentation developed poor chocolate flavour, whereas storage in a deep-freezer did not prevent the development of satisfactory flavour provided the beans had not previously been dried.

860. de Witt, K. W.
Nitrogen metabolism in fermenting cacao.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 54-7, bibl. 24.

The nitrogenous components of cacao have been analysed at various stages of fermentation carried out at different times during the harvesting season. Protein is removed during the fermentation, by hydrolysis to amino acids and peptides, and by conversion to an insoluble fraction which does not yield amino acid on hydrolysis. In well fermented cacao very little protein remains at the end of fermentation; the quantity of protein-bound amino acid is suggested as a measurement of the degree of fermentation. Liberation of amino acids in cacao heated to fermentation temperatures without inoculation with micro-organisms occurs much more slowly than in fermentation. The amino acid composition of cacao protein has been determined both qualitatively and quantitatively. [Author's summary.]

861. Forsyth, W. G. C., and Quesnel, V. C.
Cacao glycosidase and colour changes during fermentation.
J. Sci. Food Agric., 1957, **8**: 505-9, bibl. 11.

The first stage in the destruction of the anthocyanin pigments in cacao beans during the curing treatment is hydrolysis by a glycosidase. The relevance of this reaction to the quality of the processed bean is discussed. [Authors' summary.]—Colon. microbiol. Res. Inst., Trinidad.

862. Howat, G. R., Powell, B. D., and Wood, G. A. R.
Experiments on cocoa drying and fermentation in West Africa.
Trop. Agriculture, Trin., 1957, **34**: 249-59, bibl. 2, illus.

In some cocoa-growing areas it is desirable, and in others necessary, to dry the fermented cocoa beans artificially rather than by the heat of the sun. After a brief review of the different types of dryer in use and a statement of the problem of artificial drying, an account follows of experimental work in Ghana with a dryer of the stationary tray type. It has been established that cocoa beans can be dried at high temperature and in a short time without detriment to the subsequent chocolate flavour. [Authors' summary.] The oil-fired prototype Chula cocoa dryer used is described and illustrated. The previous season's findings on fermentation [*H.A.*, 27: 2845] were confirmed.—Cadbury Bros., Bournville.

863. Anon.
The Samoan cocoa drier.
[*Publ.*] *Cadbury Bros., Bournville*, 1957, pp. 23, illus.

An account is given of the construction and testing at Bournville of a prototype drier based on the type used in Samoa. Its efficiency and economy have subsequently been confirmed in the Cameroons, where over 50 driers have been constructed of materials available locally. Each drier consists of a platform, 12 ft. × 10 ft., set over a flue made of 6 oil drums about 16 ft. long; its capacity is 500–600 lb. dry beans. A thatched roof is provided to shelter both the drier and fermentation boxes. An appendix summarizes the results of 9 experiments carried out in either a large or a small drier, and in which numerous temperature readings were recorded and many samples of beans tested for moisture content.

864. FORSYTH, J.
Insect infestation in stored cocoa in Ghana.
Ghana Fmr,* 1957, **1**: 133-5.

The insect pests of stored cacao beans are listed, the most important being the cocoa moth (*Ephestia cautella*), the cocoa weevil (*Araecerus fasciculatus*) and the tobacco beetle (*Lasioderma serricorne*). Hygiene and ensuring that the moisture content of the beans is low aid control. The only insecticide at present permitted for use in Ghana stores is pyrethrum, the effectiveness of which is greatly enhanced by adding the synergist piperonyl butoxide. Known in this form as Pybuthrin it is applied in white oil by fogging with a Microsol machine. If methyl bromide fumigation is used it should precede fogging with Pybuthrin.

Coconuts.

(*See also* 958, 959q, 960c, g, k, 1008.)

865. FAO AGRICULTURE DIVISION.
Technical aspects and problems of coconut production and processing.
Tech. Inf. Circ. FAO **24**, 1957, pp. 9.

Deals briefly with research in Ceylon, India, Indonesia and the Philippines. Touches on the following technical aspects and problems: cultural practice, replanting with improved seedlings, hybridization, diseases and pests (especially kadang kadang and rhinoceros beetle). Refers to technical aspects and problems of processing and promises in 1957 a Development Paper on the processing of copra in rural industries.

866. ANON.
NPK in coconut cultivation.
Coconut Bull., 1957, **11**: 38-47, illus.
Improving coconut yields by NPK manuring.
Potascheme NPK Pamphl. **1**, summarized in *World Crops*, 1957, **9**: 379-81, illus.

These articles describe a most ambitious co-operative experiment on the manuring of coconuts. In 1951–52 170 fields were selected in various parts of the west coast coconut belt of South India. Part of each field has been supplied in each year since then with a 1:1:2 NPK fertilizer mixture (with higher rates of N and P in the first 3 years) and part has been left unfertilized. Palms, some 22,000 in number, were individually recorded. In 103 fields NPK has resulted in substantial yield increases from the third year onwards.

867. CUMBER, R. A.
Ecological studies of the rhinoceros beetle, *Oryctes rhinoceros* (L.), in Western Samoa.
Tech. Pap. S. Pacific Commiss. **107**, 1957, pp. 32, bibl. 6, illus., price 4s. sterling.

Detailed studies on many aspects of the rhinoceros beetle problem in Western Samoa are described. The need for strengthening field sanitation measures is stressed. This should reduce the number of beetles bred within plantations, but it would not solve the problem of invasion from jungle areas in the centre of the island, which provide an immense reservoir of beetles. The influence of these jungle-bred beetles might, however, be reduced by establishing belts of alternative crops and also of coconuts that are very closely spaced and maintained in this condition by replanting whenever necessary. In addition, active re-planting and consolidation of the coastal plantations should reduce damage by diluting the beetle population among a larger number of palms. An appendix gives details of recent work on entomogenous bacteria and elaterid predators. The bacteria have shown little promise; only small numbers of the elaterid beetles have so far been liberated.

868. LUC, M.
Nématodes et "maladie de Kaïncopé" du cocotier. **(Nematodes and "Kaïncopé disease" of coconut palms.)**
Oléagineux, 1957, **12**: 691-3, bibl. 6.

The disease somewhat resembles "unknown disease" of coconut palms in Jamaica and may thus be due to a virus. It has spread from the Gold Coast into French Togo. Preliminary investigations of rhizosphere fauna suggest that the nematodes *Xiphinema campinense*, *Hemicycliophora pauciannulata* and *Rotylenchus bradys* may be either indirect causal agents or vectors.—O.R.S.T.O.M., Abidjan, Ivory Coast.

Coffee.

(*See also* 639, 959k, o, p, v, y, 960w, 961c, 995.)

869. CASTILLO Z., J.
Mejoramiento de café arábica var. típica. Utilización del registrc de producción de arboles madres. **(Selection of the typica variety of arabica coffee. Use of the yield records of parent trees.)**
Cenicafé, 1957, **8**: 117-44, bibl. 19.

There was very little correlation between the yields of parent trees and that of their progeny in high and low yielding groups over a 4-year period. Yields were, however, correlated with plant vigour.

870. DA COSTA MACEDO, J. C.
Preparação da semente de café por fermentação e por exposição ao sol. **(Preparation of coffee seed by fermentation and by sun drying.)**
Rev. Café portug., 1957, **4**(13): 34-46, bibl. 2.

From comparative experiments in Angola it was concluded that the viability of coffee seed was reduced by sun drying, even when the moisture content was not unduly decreased. Fermentation, however, slightly improved viability and was more economic. The

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*Formerly *New Gold Coast Farmer*.

recommended procedure is: depulping, fermentation for 3–5 hours, removal of mucilage, exposure to sun for not more than 10 hours and completion of drying in the shade.

871. Gaie, W.
Bouturage du caféier d'Arabie. **(Propagation of arabica coffee by cuttings.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 175-96, bibl. 15, illus.

Extensive trials in propagating frames and nursery beds showed that 6 cm. was a better length than 3 cm. for cuttings and confirmed the superiority of split to whole cuttings. Rooting was not improved (in fact it was often checked) by IBA or NAA, but was markedly increased by the addition of coffee parchment or sawdust to the 2 : 5 soil/sand rooting medium, followed by disinfection with 5% formalin 10 days before planting. The only profitable cuttings were those taken from the 2nd, 3rd or 4th nodes of shoots (i.e. near the tips), and a period of 70 days in the frame was preferable to either 60 or 80 days.—Stat. Rech. agron. Mulungu-Tshibinda.

872. Triana B., J. V.
Informe preliminar sobre un estudio de modalidades del cultivo del cafeto. **(Preliminary report on a study of methods of coffee growing.)**
Cenicafé, 1957, **8**: 156-68, bibl. 3.

Bourbon and typica coffee varieties were planted in the traditional Colombian manner (under shade) and unshaded, as in Brazil. Although no rigid conclusions could be drawn from the 2 harvests so far realized, average yield increases from absence of shade were 179% in bourbon and 120% in typica. Unshaded plants began bearing about 7 months before shaded plants and their high yields could only be maintained by increased rates of manuring. The same fertilizer application produced a 61% average yield increase in the sun but only 13% in the shade. In the sun typica showed a much greater fertilizer response than bourbon. With 4 plants instead of 1 per hole, production increased by an average of 104% in typica and 68% in bourbon, the effect being greater without than with shade, and fertilizer responses in the 2 varieties were approximately equal.

873. Cordón, J., and others.
El cultivo del café al sol en El Salvador; resultados de tres años en un predio al sol en Santa Tecla. **(Growing coffee without shade in El Salvador; results of three years in an unshaded plantation in Santa Tecla.)**
Café El Salvador, 1956, **26**(298/299): 421-7, from abstr. in *Supl. bibl. Turrialba*, 1957, **7**: 15.

Preliminary trials (based on similar studies in Guatemala) showed considerable coffee yield increases from abandoning shade, but some trees suffered temporarily from over-production.

874. Griffing, J. B.
O emprego da cobertura morta em cafeeiros. **(The use of mulches in coffee plantations.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(363): 8-17, illus.

Mulching with dried grass or straw at 20 tons per ha. greatly increased root production, yield and plant vigour and prevented defoliation during drought. Grasses recommended are *Panicum maximum* and *Hyparrhenia rufa.* Other suitable materials include crop wastes from coffee, rice or maize, compost and animal manure. In new plantations 6–7 tons per ha. will be sufficient if applied round each tree or between rows. The beginning of the wet season is the best time for application and the mulch should not be removed during harvesting. Mulching should be avoided in frost pockets.

875. Pereira, H. C.
Field measurements of water use for irrigation control in Kenya coffee.
J. agric. Sci., 1957, **49**: 459-66, bibl. 27, illus.

The results of 10 years' soil moisture studies in arabica coffee grown under high-altitude, tropical conditions are presented. Sampling was carried out to a depth of 10 ft., which includes most of the root zone of arabica coffee. Wilting points determined by sunflower seedlings on soil samples to a depth of 15 ft. were shown to agree with field sampling under wilting conditions in coffee plantations. A series of seasonal factors relating the water use of the coffee crop to the readings of an evaporation pan are presented, and their application over 6 years is shown to agree with soil sampling data within the limits of sampling error. This method is proposed for control of supplementary irrigation under conditions of limited water supply, but a distillation-type radiation integrator could with advantage be used instead of the evaporation pan. [See also *H.A.*, 27: 3933.]—E.A.A.F.R.O., Muguga, Kenya.

876. Malavolta, E., and Coury, T.
Nota sôbre á aplicação de urèia em pulverização no cafeeiro. **(Note on spray application of urea to coffee bushes.)** [English summary 6 lines.]
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(362): 14-15, bibl. 1.

Two applications, a fortnight apart, of 2·5% urea at 2 l. per bush effected a striking recovery of 3-year-old N-deficient coffee bushes and increased foliar N from 2·38% to 3·42%.

877. Orlido, N. M., and Capinpin, J. M.
Morphology and cytology of coffee.
Philipp. Agric., 1957, **41**: 53-67, bibl. 12, illus.

Anatomical and morphological studies on the course of flower fertilization and fruit development in robusta, excelsa and liberica coffee are described. In 10 trees of each species under observation the percentages of flowers developing into mature berries were: liberica 46·6, excelsa 43·8 and robusta 38·7. Fruit drop occurred in two waves; during the first, which began after petal fall, unfertilized and incompletely fertilized ovaries were shed, and during the second, which began in the fifth month, a few small, though otherwise normal, berries were discarded. All three species produced a considerable number of peaberries and a pronounced negative correlation was found to exist between fruit-set and peaberry percentage. Some

3-seeded berries were found in all the species but there were no empty beans. Chromosome counts made on root tips showed $2n=44$ in each case.

878. DROUILLON, R.
Quelques considérations sur les traitements effectués à l'aide de pulvérisateurs pneumatiques à grande portée dans les plantations de caféiers. **(Some observations on the treatment of coffee plantations with long-range mist-blower spray apparatus.)**
Agron. trop., 1957, **12**: 333-44, bibl. 4, illus.

The Hardie and Swissatom-2000 sprayers were compared and modifications were introduced in an attempt to determine the combination of factors best suited to the long-range application of fungicides to coffee bushes. For satisfactory results droplet size should be between 80 and 200 μ and output not less than 10 l. per min. A ring of many jets is preferable to a central cone or to one or two jets. In general, the speed of output of a fungicide must be about 50% greater, and the distance 30% less than for insecticide treatments.—Serv. Agric. Oubangui.

879. MEIFFREN, M.
La rouille du caféier en Côte d'Ivoire. **(Rust of coffee in the Ivory Coast.)**
Bull. Centre Rech. agron. Bingerville, 1955, No. 10, pp. 61-6, illus., [received 1957].

In this area Indénié (*Coffea abeokutae*), Kouillou (*Coffea canephora* var. *typica*) and robusta INEAC are all attacked by rust (*Hemileia vastatrix*), the percentage of leaf infection being highest with robusta INEAC. In control trials the best results have been obtained with copper oxide and copper oxychloride. Cultural methods of control must also be carried out.

880. MCCRAE, D. J.
The control of antestia (*Antestiopsis* spp.) with malathion.
Mon. Bull. Coffee Bd Kenya, 1957, **22**: 152-3.

The results are summarized of 5 spraying experiments, which show that malathion can control antestia as well as, or better than, pyrethrum and several other compounds, and that 2 pints of concentrate per acre are equally effective whether applied by a high-volume sprayer (in 120 gal. water), a medium-volume sprayer (in 60 gal.) or a low-volume sprayer (in 15 gal.). There has been no evidence of phytotoxicity or taints following the use of malathion, but its compatibility with copper remains to be determined.

881. WILLET, J. R.
Bessenbubuk in de koffie. **(Coffee berry borer.)** [Indonesian and English summaries ¼ p. each.]
Bergcultures, 1957, **26**: 383-401, bibl. 13.

In laboratory tests endrin was particularly effective against *Stephanoderes hampei* and aldrin and lindane also showed promise, while in a field trial lindane dusts and dieldrin sprays and dusts effectively reduced borer populations. Economic losses as a result of borer infestation have been calculated. When berry infestation is above 10%, the following chemical control is recommended: when the berries begin to harden, 2 dusts of 1% endrin or 2½% aldrin should be applied at an interval of 15 days, or 3 dusts of 1% lindane at intervals of 10 days; when infestation is less than 10% monthly dustings of affected areas are recommended.—Proefst. C.P.V., Djember.

882. PUZZI, D., AND ORLANDO, A.
Ensáios preliminares de combate à mosca do mediterrâneo—*Ceratitis capitata* (Wied.) por meio de aplicação de inseticidas no sólo. **(Preliminary trials of soil application of insecticides for control of the Mediterranean fly, *Ceratitis capitata*).**
Biológico, 1957, **23**: 61-9, bibl. 7, illus.

In laboratory experiments, infested coffee "cherries" were placed on sand treated with 7·5 p.p.m. of aldrin, 12 p.p.m. of chlordane or half the rate of each. Excellent control was given by the higher rate of aldrin, which was equivalent to 9·5 g. of 2·5% powder per sq. m. in the field.

883. CALLE V., H.
Activadores bioquímicos para la fermentación del café. **(Biochemical activators for coffee fermentation.)**
Cenicafé, 1957, **8**: 94-101, bibl. 7, illus.

The commonest organisms in mucilage during natural fermentation were *Oidium lactis* and *Mycoderma* sp. Mucilage collected after 1 day and allowed to ferment for a week was added at 1 l. to 10 l. freshly depulped coffee, reducing the fermentation time by one-third. A much greater reduction was achieved using 2% of a powder prepared from a species of *Penicillium* (possibly *P. spinulosum*) grown on coffee pulp. Trials with other fungi are in progress. Incidentally, coffee pulp is proving an excellent medium for large-scale production of fungal sources of antibiotics.

Mangoes.

884. RUEHLE, G. D., AND LEDIN, R. B.
Mango growing in Florida.
Bull. Fla agric. Exp. Stats **574**, 1955, pp. 90, bibl. 81, illus. [received 1957].

In 1954 there were nearly 350,000 mango trees in Florida occupying some 7,000 acres of land. More than half these trees, or about 4,000 acres, were in commercial groves, and of these slightly over 2,000 acres had been planted since 1950. This comprehensive bulletin describes the history and distribution of the fruit in Florida, its uses and food value, the botany of the tree, varieties and their classification, propagation and cultural practices, yields and marketing, and diseases and pests and their control.

885. RAO, V. N. M., AND RAO, I. K. S.
Mango grafting with the aid of plastic film wrapper.
South Indian Hort., 1956, **4**: 54-5, bibl. 3, illus.

Alkathene, 100-gauge, was wrapped round the soil ball of mango seedling rootstocks before they were inarched to scion shoots. Successful unions were obtained in 7 out of 10 cases. The reduction in evaporation resulting from the use of polythene saved labour and reduced costs.—Cent. Cashewnut Res. Stat., Mangalore.

886. RAO, V. N. M., AND RAO, I. K. S.
Propagation of mango by air-layering.
South Indian Hort., 1956, **4**: 56-7, bibl. 2, illus.

Shoots of Bennet Alphonso were air-layered in February and those of Kalapadi in May, and the marcots were wrapped with polythene film. Success with Bennet Alphonso was 24%, but 9 out of 10 of the Kalapadi marcots rooted and were detached successfully.—Cent. Cashewnut Res. Stat., Mangalore.

Oil palms

(*See also* 959i, 960i.)

887. Dupriez, G., and Brédas, J.
Pépinières d'*Elaeis*. (Oil palm nurseries.)
Bull. Inf. I.N.E.A.C., 1957, **6**: 205-25, bibl. 6, illus.

In the traditional systems seedlings are grown for 3 months in pre-nursery beds and are then set out either in rows in prepared nurseries or in individual baskets under cover. In general growth is more uniform in the first system, but a modification of the second, in which the seeds are sown direct in the baskets, has given very promising results. The most satisfactory and economic system, however, appears to be that of pre-nursery culture in small baskets followed by nurseries on open ground. Shading, watering, mulching, manuring and the control of *Cercospora elaeidis*, *Helminthosporium halodes*, *Temnoschoita* (curculionid) spp. and *Pimelephila ghesquierei* are described.

888. Sparnaaij, L. D.
Mixed cropping in oil palm cultivation.
J.W. Afr. Inst. Oil Palm Res., 1957, **2**: 244-64, bibl. 12.

An account is given of several experiments in Nigeria, the Belgian Congo and Dahomey, in which several establishment methods, including intercropping with food crops, have been compared. In general, intercropping has been found to stimulate the growth of young palms with a consequent increase in early yields. In later years the effects of intercropping on yields become less pronounced or may even become detrimental. It would appear that the beneficial effects of intercropping may be prolonged where soil fertility and moisture conditions are satisfactory but light is a limiting factor; under such conditions its effect seems to be due mainly to an improvement in the sex ratio and is seasonal in character. By contrast, where soil fertility or soil moisture are the limiting factors, intercrops may soon cease to have a beneficial effect.

889. Broekmans, A. F. M.
Growth, flowering and yield of the oil palm in Nigeria.
J.W. Afr. Inst. Oil Palm Res., 1957, **2**: 187-220, bibl. 11.

Observations on growth and flowering have been carried out over a number of years on palms established in 4 experiments at W.A.I.F.O.R. Main Station and in yield trials at 3 outstations. The data obtained have been examined in relation to environmental conditions, notably variations in rainfall and sunshine [see also *H.A.*, 27: 2903]. Three stages in the development of the leaf or inflorescence can be recognized. 1. *The stage of initiation of the leaf or inflorescence bud.* No relationship has been established between the rate of initiation and annual variations in climate. 2. *The stage of sex differentiation of the inflorescence.* The sex ratio, and hence the number of bunches, varies considerably with season. There is evidence that high light intensity favours the differentiation of female inflorescences. Thus a period in which a relatively high proportion of female inflorescences is produced owes its origin to a dry, sunny season two years earlier. 3. *A critical stage in the development of the leaf or inflorescence during which they are particularly sensitive to external influences.* This occurs when the inflorescence starts to increase rapidly in size. Adverse conditions at this stage may retard its growth or in some cases, especially in young palms, cause it to abort. *Bunch yields.* Variations in the annual bunch yield of palms can be attributed to variations in leaf production, sex ratio, floral abortion and weight per bunch. There is a close correlation between dry season rainfall and the bunch yield obtained two yield cycles later.

890. Broeshart, H.
The application of foliar analysis to oil palm cultivation. IV. The diagnosis of multiple deficiencies.
Trop. Agriculture, Trin., 1957, **34**: 269-76, bibl. 11.

Studies on the effects of multiple deficiencies in a sand culture experiment have shown that a reliable diagnosis of nutritional disorders in the oil palm cannot be based on visual symptoms only, but should be checked by subsequent foliar analysis. Symptoms, characteristic for a particular deficiency, may be masked by the symptoms of a second deficiency. The level of a deficient element in the leaf is very little influenced by other deficiencies and antagonisms generally occur between elements of which only one is deficient. Characteristic changes in leaf composition are given for the combination of K+Mg, K+P, and P+Mg deficiency, which are frequently encountered in the Belgian Congo. Sulphur deficiency may be induced, if the fertilizer applications do not include S. S deficiency symptoms, consisting of a pale green necrotic spotting, appear quickly. The levels of K, Ca, Mg, P, N and ash then remain normal. The white chlorotic streaking known as "infectious chlorosis" would seem to be either a true K deficiency symptom, or an abnormal condition associated with K deficiency. [From author's summary. For earlier parts see *H.A.*, 26: 3152 and 4182 and 27: 891].—Res. Dep., Huilever S.A., Yaligimba, Belgian Congo.

891. Dell, W., and Arens, P. L.
Inefficacité du phosphate naturel pour le palmier à huile sur certains sols de Sumatra. **(Ineffectiveness of natural phosphate for oil palms on certain Sumatra soils.)**
Oléagineux, 1957, **12**: 675-83, bibl. 13.

Oil palm yields were increased by the application of natural phosphate only where soils contained adequate K and Mg. On K-deficient soils the phosphate decreased yields and reduced K uptake; $K_2O : P_2O_5$ ratios below 2·9 in the leaves indicated K deficiency in the soil. On soils rich in Mg, but poor in major nutrients, the phosphate reduced yields very markedly and decreased the $K_2O : MgO$ ratio in the leaves. Leaf composition should be studied before taking the risk of using phosphate alone.—Serv. agron. Soc. financière Caoutchoucs, Medan, Sumatra, etc.

892. van Wambeke, A.
Contribution à l'étude des phénomènes de jaunissement du palmier à huile dans la Tshuapa. **(Contribution to the study of the symptoms of yellowing in oil palms in the region of the Tshuapa river.)** [Flemish summary 1½ pp.]
Bull. agric. Congo belge, 1957, **48**: 889-904, bibl. 9.

Malformation of the crown and yellowing of leaflets, common in oil palms about 15 years old in the Tshuapa area, was invariably associated with deficiencies of Mg and Ca in the leaves. In some instances K was also deficient, but in general the K/Mg ratio rose as the Mg content decreased. A uniform paleness of the leaflets was the result of N deficiency. Soils containing less than 30% of clay in the top 60 cm. are considered unsuitable for oil palms. Treatments recommended comprise mulching, green manuring with leguminous cover crops and the application of 0·5 kg. of magnesium sulphate and 1·5 kg. of lime per tree, followed 6 months (or more) later by Mg and K fertilizers, applied most liberally on the heavier soils.—Div. Agrol., I.N.E.A.C.

893. Ferrand, M.
La carence magnésienne dans la cuvette centrale congolaise. **(Magnesium deficiency in the middle Congo basin.)**
C.R. Acad. Agric. Fr., 1957, **43**: 585-7, bibl. 2.

Leaf Mg was only 0·108% in oil palms with completely orange-yellow foliage. The leaf symptoms declined as leaf Mg rose until it reached 0·208% in healthy palms. Values for N, P, K, Ca and ash were not correlated with these symptoms. [See also *H.A.*, 27: 1909.]

894. Pronk, F.
Some notes on the influence of artificial pollination upon the production of oil palms.
Trop. Agriculture, Trin., 1957, 34: 266-8.
Is kunstmatige bestuiving bij oliepalm van invloed op de productie? **(Has artificial pollination of the oil palm an effect on production?)** [English and Indonesian summaries 8 and 10 lines.]
Bergcultures, 1957, **26**: 317, 319.

Comparisons over 7 years between palms that were normally pollinated and palms that were pollinated artificially, an average of 3 times each year, did not reveal any consistent beneficial or adverse effect on yield arising from the use of artificial pollination.—A.V.R.O.S. Exp. Stat., Medan, Indonesia.

895. Robertson, J. S.
Spraying trials against freckle, a leaf disease of oil palm seedlings caused by *Cercospora elaeidis* Stey.
J.W. Afr. Inst. Oil Palm Res., 1957, **2**: 265-71, bibl. 3, illus.

The results are given of 4 spraying experiments involving the use of copper and organic fungicides with and without the addition of the sticker Triton X114. All fungicides gave a significant degree of control compared with the unsprayed checks, but those containing copper were phytotoxic. The most efficient fungicide appeared to be ziram w.p. used at 2 lb./100 gal., which controlled anthracnose as well as leaf spot. The distribution patterns of this and other fungicides on the leaves and the degrees of control obtained were much improved by the use of the sticker. In one small trial, which did not include ziram, griseofulvin gave significantly the best control.

896. Dufrane, M., and Berger, J. L.
Étude sur la récolte dans les palmeraies. **(Study of harvesting in oil palm plantations.)** [Flemish summary 3¼ pp.]
Bull. agric. Congo belge, 1957, **48**: 581-640.

The study was aimed at organizing harvesting to obtain the greatest possible yield of oil of minimal acidity with maximal economy of labour. Bunches averaging 5 kg. in weight should be harvested when 50–60 fruits have fallen. As acidity increases with ripeness, fallen fruits should be gathered as frequently as labour cost allows. Frequency of cutting in the area studied (Bokondji, Belgian Congo) should be between 4 and 10 days. In plantations yielding 12–13 tons of bunches annually and harvested at 4–7 day intervals, 500 kg. per man per day is the most economic rate of harvesting.

897. Marynen, T., and Gillot, J.
L'élimination des vieux palmiers par empoisonnement. **(Removal of old oil palms by poisoning.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 167-74, bibl. 4, illus.

For destruction of old palms prior to replanting, a very concentrated solution of sodium arsenite (50–100 g. per 100 c.c. of water) is poured into a hole bored in the trunk and the opening is plugged. The stronger the solution, the more rapid is its action. Insertion of powdered arsenite followed by water is less than 50% effective.

Papaws.

(*See also* 404.)

898. Awada, M., and Ikeda, W. S.
Effects of water and nitrogen application on composition, growth, sugars in fruits, yield, and sex expression of the papaya plants (*Carica papaya* L.).
Tech. Bull. Hawaii agric. Exp. Stat. **33**, 1957, pp. 16, bibl. 18.

The concentration of minerals except Ca and Mg and the moisture content of papaw plants grown under a high rate of irrigation were significantly higher than those of plants grown with little irrigation. The latter, however, contained more total sugars. The plants in the high-irrigation plots grew significantly faster. Age and moisture level of the plant were two of the more important factors which affected growth. When the hermaphroditic fruits were segregated into their component fruit types, the production of types 2 and 3 fruits (carpellodic) was significantly greater in the high-irrigation plots, but there was no difference in the yield of type 4 (solo) fruits. The percentage of types 2 and 3 fruits was also significantly higher in the high-irrigation plots, but that of type 4 fruits was significantly higher in the low-irrigation plots. These results suggest that there is a relationship between sex expression and either the moisture level or growth of the plant.

Pineapples.

(*See also* 839, 959c.)

899. Su, N. R.
Spacing and fertilizer level as two dominant factors in the production of pineapples. [Chinese summary 1 p.]
J. agric. Ass. China, 1957, No. 17, pp. 42-67, bibl. 4.

In experiments with Smooth Cayenne pineapples, measurements taken during the earlier stages of growth showed that fertilizer requirements increased with stand density. During the period of maximum growth a high rate of manuring gave the best result, irrespective of spacing. The number of suckers per plant did not decrease with increased plant density, but there was a difference of 10% sucker production between plants receiving a low rate and those receiving the high rate of fertilization. The number of slips per plant decreased significantly with closer planting, but the decrease was not of practical significance. Slip number increased with increasing fertilizer level. Average fruit weight and fruit size was significantly reduced with increased density, but was significantly increased at higher fertilizer levels. The highest yield was obtained from the plots with the highest plant density and the heaviest fertilizer application. The percentage of plants affected by mealybug wilt was negatively correlated with stand density. The results show that a spacing of 90 cm. between the beds, 60 cm. between rows, and 30 cm. between plants gave the most satisfactory results. The recommended level of fertilizer is 560 kg. N, 140 kg. P_2O_5 and 560 kg. K_2O per Chia (approximately 1 hectare) applied during the 2 years of cropping.—Tou-Liu Pineapple Exp. Stat., Formosa.

900. Cannon, R. C.
Pineapples need plenty of potassium.
Qd agric. J., 1957, **83**: 313-16, illus.

It has been found that on the light-textured Queensland soils pineapple plants need about double the amount of K normally applied. Instead of a standard fertilizer schedule, using a 10 : 6 : 10 mixture and sulphate of ammonia alternately, a 10 : 6 : 10 mixture is recommended for each of 4 applications a year, i.e. 6 applications between autumn planting of tops and harvesting the plant crop. Thereafter, the ratoons should receive sulphate of ammonia followed by 4 more applications of the 10 : 6 : 10 mixture within the next year. The author considers that under this fertilizer programme a good summer plant crop would be followed by a ratoon crop within 12 to 15 months. J.R.L.

901. Johnston, A.
Bacterial heart rot of the pineapple.
Malay. agric. J., 1957, **40**: 2-8, bibl. 7, illus.

Pineapple heart rot disease is shown to be caused by a strain of *Erwinia carotovora*. In a field experiment spraying with bordeaux mixture and streptomycin sulphate, though reducing the number of diseased plants, did not give adequate control. The following measures are recommended to reduce the risk of infection: (a) dipping the slips in bordeaux mixture before planting, (b) taking care not to allow contaminated soil to enter the heart of the plant, (c) removing and burning badly affected plants, and (d) removing the infected leaves and heart of slightly affected plants and spraying the centre of the plant with a copper fungicide. J.R.L.

Rubber trees.

(*See also* 957, 959m, s, z, 960f, p, t, x-z, 961f.)

902. Tong, T. H., and Helle, C. F.
Leidraad voor het waarnemen van secundaire eigenschappen van heveaclonen bij het A.P.A. **(Guide for observations on secondary characteristics of hevea clones at the A.P.A.)** [Indonesian and English summaries 20 and 18 lines.]
Bergcultures, 1957, **26**: 359-75, bibl. 7, illus.

The importance of other data besides yield records in the evaluation of hevea clones is emphasized, and a guide for observing and describing secondary characteristics is given. The morphological characters discussed are growth habit, bark quality, latex characters, resistance against diseases and climatic conditions, genetical value, and wintering and flowering behaviour.—Alg. Proefst., A.V.R.O.S., Medan.

903. Rubber Research Institute of Malaya.
Magnesium deficiency.
Plant. Bull. R.R.I.M., 1957, No. 31, pp. 66-9, illus.

Magnesium deficiency of rubber trees, which has been recognized fairly recently, is widespread in Malaya, occurring most frequently on inland soils. Soil applications of fertilizer compounds containing Mg are recommended for affected trees. Supplying a small amount of Mg to the planting hole may help to avoid the occurrence of deficiency symptoms in young trees.

904. Wijbrans, J. R.
Bliksemschade in jonge hevea-aanplanten. **(Lightning damage in young rubber plantations.)** [English and Indonesian summaries 9 and 12 lines respectively.]
Bergcultures, 1957, **26**: 291-7, bibl. 14, illus.

Lightning damage occurs frequently among young rubber trees and this is attributed to tree habit. Symptoms and secondary effects are described, and the relationship between lightning damage and canker is emphasized. Dead branches and canker patches should be cut out from damaged trees as soon as possible.

Sugar cane.

(*See also* 959d, f, t, x, 960a, b, l, o, r, s, 961b, e, 995, 1014.)

905. Pandey, J. P., and others.
Crop surveys in Bihar. VI. Studies in the estimation of acre-yield of sugarcane (1954-55 and 1955-56).
Indian J. Sugarcane Res., 1957, **1**: 130-8, bibl. 5.

The estimation of acre-yields of cane in Bihar by means of random sample surveys has been carried out each year since 1942–43. In the latest surveys a modified procedure has been used with an appreciable gain in precision in some areas. The surveys show that a downward trend in yields from 1942–43 to 1946–47 has been followed by a steady upward trend. They also show that, on an average, plant canes yielded more than 100 maunds per acre more than ratoons and that mixtures of F.Y.M. and inorganic fertilizers gave better yields than either type of manure used alone. Districts have been mapped according to their yield potential.—Cent. Sugarcane Res. Stat., Pusa.

906. Tandon, R. K., Agarwala, D. C., and Singh, R. P.
Raising average cane yields in Uttar Pradesh, by proper ratooning methods.
Indian Sugar, 1957, 7: 215-21, 226, bibl. 18.

The results of experiments, some of which have been published previously, carried out at the Sugarcane Research Station, Muzaffarnagar, and elsewhere in Uttar Pradesh on various aspects of ratoon cropping are given. Co.S.245 and Co.S.321 produced better ratoon yields than Co.421, Co.453 or Co.356. Compared with the plant crop the average percentage decreases in yield of the first, second and third ratoons were 13·4, 27·9 and 33·2 respectively when the ratoons were manured and 58·5, 68·7 and 74·3 respectively in the case of unmanured ratoons [see also *H.A.*, 23: 4670]. The best period in which to harvest plant cane to promote high ratoon yields was from February to April. There were indications that cane planted in furrows produced slightly better ratoon crops than cane planted on the level, and that harvesting earthed-up plant cane at ridge level gave better ratoon yields than cutting at ground level. In a comprehensive experiment the highest yields were obtained when the trash was burnt on the spot, the ridges completely dismantled and 20 lb. N per acre and 4 irrigations applied to each ratoon crop. A 10% increase in yield was obtained in a ratoon crop, in which a catch crop of *Cyamopsis psoraloides* was grown and cut early for fodder. For first ratoons 140 lb. N per acre, applied half after harvesting the plant crop and half after the rains, proved the optimum economic dose. The effect on ratoon canes of manures applied to the plant cane are discussed. J.R.L.

907. King, N. J.
A study of low c.c.s. at Babinda.
Cane Grs' quart. Bull., 1957, **21**: 23-9.

During recent years there has been a serious decline in the quality ratio of cane grown in the Babinda district of Queensland, where the rainfall averages 162·5 ins. A study has shown the main causes to be: (i) change in varietal status, notably the replacement of Badila by Pindar; (ii) climatic factors, and especially the number of wet and cloudy days in the period April to July; (iii) cane deterioration due to delays between burning and crushing; and (iv) increased use of mechanical loading with attendant increases in the amount of soil carried with the cane.

908. Dutt, N. L., and Hussainy, S. A.
Latest developments in sugarcane breeding adopted at Coimbatore.
Indian J. Sugarcane Res., 1957, **1**: 123-9, bibl. 5, illus.

Recent improvements in crossing technique, bagging of arrows, the raising and selection of seedlings and the packing of cane setts for shipment overseas are outlined. To obtain isolated arrows for controlled cross pollinations a system of marcotting with polythene film has been adopted; two or three nodes near the top of each stalk are covered and roots start to appear from the sixth day. Polythene has also proved the best of several materials tested for enclosing setts to be shipped by air.—Sugarcane Breed. Inst., Coimbatore.

909. Brett, P. G. C.
The identification of the more important sugarcane varieties grown in S. Africa.
Bull. S. Afr. Sugar Ass. Exp. Stat. **4**, 1957, pp. 23, illus.; issued as *Suppl. S. Afr. Sugar J.*, 1957, Vol. **41**, No. 8.

Characters of Co.301, Co.331, N:Co.292, N:Co.293, N:Co.310, N:Co.334, N:Co.339, N:Co.376 and N:Co.382 are described, with clear illustrations in each case of the node, internode, bud and leaf sheath. J.R.L.

910. Brett, P. G. C., and Thomson, G. M.
Present indications of the comparative yielding ability and disease resistance of the more important sugarcane varieties of South Africa.
Bull. S. Afr. Sugar Ass. Exp. Stat. **3**, 1957, pp. 3, illus., issued as *Suppl. S. Afr. Sugar J.*, 1957, Vol. **41**, No. 6.

The bulletin gives a graphic representation of the comparative yielding ability of Co.301, Co.331, N:Co.292, N:Co.293, N:Co.310, N:Co.334, N:Co.339, N:Co.376 and N:Co.382 in each of the 4 main regions of the South African sugar cane belt and their resistance to ratoon stunting disease, mosaic, streak, chlorotic streak, gumming disease, smut, red rot and sheath rot. J.R.L.

911. Birkett, L. S., and Cameron, C.
Field experiments with sugar cane, XXV. 1. Variety trials, 1956.
Sugar Bull. Brit. Guiana Dep. Agric. **25**, 1957, pp. 1-45.

Results with B.41227, B.47258 and B.49119 continue to be good, and three other varieties B.45137, B.43413 and D.37/45 are considered promising.

912. Obaidullah Jan, M.
Sugarcane requirements of farmers and factories.
Agric. Pakist., 1956, **7**: 349-58, bibl. 3.

The results are summarized of variety trials carried out at the Sugar Cane Research Station, Mardan, and on cultivators' fields in the Peshawar Valley. In addition to Co.622, which has been giving good results since 1950, Co.644 has proved outstanding. In trials on cultivators' land Co.644 out-yielded the standard variety Co.290 by 29·6% in cane tonnage and 12·4% in c.c.s., which represented an improvement of 45% in the yield of sugar per acre.

913. Tang, K. H., and Ho, F. W.
A comparative study of different planting systems in connection with the mechanized cultivation of sugarcane. [Chinese, with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1956, No. 14, pp. 36-46, bibl. 10, illus.

In 8 experiments at 6 locations 4 planting systems were compared over 2 years, viz. ridge, level, single-row furrow and double-row furrow. The ridge and level planting systems, in which the plants were not earthed-up, produced significantly smaller yields, except where the water-table was high, than either furrow system. In the ridged and level areas lodging due to wind was accentuated, and the individual stalks were also shorter and lighter. The differences in cane yield between the crops from the two furrow systems of planting were not significant. J.R.L.

914. ANON.
Bullock drawn implement for planting sugar-cane.
Indian J. Sugarcane Res., 1957, **1**: 183-5, illus.

A simple implement costing about Rs. 300/– is described and illustrated. It is operated by 3 men, one leading the bullocks, another seated on a wheeled fore-carriage to feed the setts into a combined planter and fertilizer distributor and the third walking behind to guide the planter.—Indian Inst. Sugarcane Res., Lucknow.

915. EVANS, H.
A practical method of approach to some soil problems affecting sugar cane growth in British Guiana.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 31-6, bibl. 2.

A practical form of evaluation of the physical and chemical properties of soils in British Guiana by means of soil pits is described. The movements of the shallow water tables can be used to estimate the permeability of the soils. Analysis of water from these soil pits provides valuable data on such factors as salinity, acidity, toxicities of cations and anions and the potential fertility of the soils.—Bookers Sugar Estates, B.G.

916. SUN, V. G., AND OTHERS.
Report on the regional tests of the earthing-up practice. [Chinese, with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1956, No. 14, pp. 1-15, bibl. 36.

An extensive 2-year study, using replicated trials on 143 farms, was made of 3 systems of earthing-up sugar cane. The treatments were: (1) the customary system of 3 ridgings beginning 2–3 months after planting, which provides ridges 30–36 cm. above the level of the setts, (2) a simplified system in which a single ridging raised the soil level by 20–25 cm. after the furrows had been closed in with cultivation, and (3) no earthing-up, but furrows filled-in by inter-tillage. On all soils except a sand and with all varieties except PT. 43-52 both earthing-up treatments were superior to no earthing-up. In most cases the customary system of earthing-up produced better yields than the simplified one, but the differences were generally not significant. J.R.L.

917. FU, H. C.
The influence of different "earthing-in" operations on the tillering trend of the sugar-cane variety N:Co.310. [Chinese, with English summary ¾ p.]
Rep. Taiwan Sugar Exp. Stat., 1956, No. 14, pp. 47-72, bibl. 9, illus.

In an experiment in which earthing-up was compared with no earthing-up and with "earthing-up and stool-spreading" (in which soil was put into the heart of each stool and the tillers pressed outwards 3 months and 6 months after planting) the no earthing-up treatment produced the largest total number of tillers, but the smallest number of millable stalks at harvest. About 80% of the tillers died from competition or borer damage before harvest, but plants from the earthed-up treatments always had more survivors than those from plants which had not been earthed-up. J.R.L.

918. BIRKETT, L. S., CAMERON, C., AND PAUL, H.
Field experiments with sugar cane, XXV. 3. Fertilizer experiments.
Sugar Bull. Brit. Guiana Dep. Agric. **25**, 1957, pp. 54-79, bibl. 7.

In the latest series of NPK experiments there was a high positive correlation between leaf N level and yield of 96° sugar. Leaf and juice analyses for P also afforded a means of determining P requirements, but no significant correlations were found between leaf K level and response to K. Factors affecting the uptake of N, P and K are discussed. Liming generally resulted in increased yields. In trials on plant canes with 5 different N and 5 different P fertilizers no significant differences were observed. In variety/fertilizer experiments B.41227 was the highest yielding of the varieties tested, but similar yields were obtained from D.37/45 at the highest N level.

919. KHAN, A. R., MISRA, K. P., AND PURI, K. D.
Varietal performance in relation to nitrogen dosage.
Indian J. Sugarcane Res., 1957, **1**: 171.

A note records that following a green manure crop and a basal dressing of 10 tons F.Y.M. and 80 lb. P_2O_5 per acre, cane responded to increasing doses of sulphate of ammonia up to 80 lb. N per acre, but showed decreases in both cane and sugar yields with a dose of 120 lb. N. However, the six varieties under trial showed pronounced differences in their response to N. —Indian agric. Res. Inst., New Delhi.

920. COWAN, I. R., AND INNES, R. F.
Meteorology, evaporation and the water requirements of sugar cane.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 22-31, bibl. 21, illus.

Penman's equation gave a very close estimate of evaporation from a free water surface at Monymusk, Jamaica, and accounted for 97% of the monthly variation in evaporation. The greatest single meteorological factor controlling evaporation was incident radiation, which accounted for about 90% of the variation in monthly evaporation. The value for the ratio between evapotranspiration from sugar cane, once the canopy was complete, and evaporation from a free water surface was determined by two independent methods and found to be of the order of 0·58. The fact that leaf elongation was found to vary linearly with the accumulated soil moisture deficit confirms that the cane plant is sensitive to changes in soil moisture, even at low tensions.—Sugar Res. Dep., Sugar Manuf. Ass., Jamaica.

921. Schmidt, N. O., and others.
Clarification studies. Some effects of drought on cane juice. Part II.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 79-82, bibl. 5.

The longer cane suffers from drought the more difficult does juice clarification become. This applies equally to plant and ratoon crops. Prolonged drought tends to reduce the phosphate content of the juice, and the special treatment needed for clarifying juice from drought-affected cane nearly always requires the addition of phosphate. [Part I was noted in *H.A.*, 26: 4255t.]—Dep. Sugar Chem. Tech., I.C.T.A., Trinidad.

922. Loh, C. S., and Tseng, P. M.
Studies on the elongative growth of sugarcane (I). [Chinese, with English summary 2 pp.]
J. agric. Ass. China, 1957, No. 17, pp. 24-41, bibl. 11, illus.

Climatic conditions in Formosa and their effect on growth of 176 sugar cane varieties have been studied. About 70% of the total length of millable stalks is formed by September-planted canes during the period of elongation growth, compared with 80% of the millable cane formed by February-planted cane. The period of elongation growth occurs in Formosa from May to September, irrespective of time of planting or of ratooning. During growth elongation there is a period of accelerated growth, generally in June or July, when the increase per month may reach 110 cm. This high rate of growth is a factor encouraging early lodging of autumn-planted cane in Formosa. In February-planted cane the occurrence of the accelerated growth period is dependent on the rainfall immediately after planting, but normally this period starts in June. Rapid growth of spring ratoons usually occurs during August, and the growth curve is similar to that of September-planted cane. Autumn-planted cane grows for 16–18 months, but it has only 1 rainy season, and therefore the growth curve only has a single peak. In the variety N:Co.310 the main period of stalk formation occurred between July and September. In about half of the varieties studied the main period of growth elongation started in April, in about 25% it started in March, and in the remainder in February. In Formosa light and rainfall proved more important to growth than temperature. Elongation growth was encouraged by high sunshine rates during July to September. Rain was important during the spring to encourage tillering. Data have shown that 200 mm. of rain from January to April is the minimum needed for normal growth.

923. du Toit, J. L.
A study of the growth, sucrose accumulation and plant food uptake of sugarcane during successive months.
Proc. 30th annu. Congr. S. Afr. Sugar Tech. Ass., 1956, pp. 114-21.

A study was made of the growth, sucrose accumulation and plant food absorption of N:Co.310 plant cane, samples of which were harvested and analysed each month. From the eighth month onwards sucrose, purity, fibre, etc., determinations were made on millable cane. Separate analyses were made of the top foot of the stalks to determine their juice quality and mineral composition. It was found that the total weight of the plant remains constant during the winter months, but there is a small increase in millable cane and an increase of sucrose during this period. The percentage sucrose reached a maximum in the spring (September). The accumulation of sucrose proceeded fairly steadily except for a slight decline following heavy rains in October. Juices from the cane tops varied greatly in sucrose and purity with the season, but they were always very high in ash and plant foods. Leaf analyses showed a possible K deficiency during the second year, the total K uptake being low during this period, although generally more K than N was taken up. The second season's uptake of nutrients was similar to that of the first but during the cold, dry winter months absorption of N, P, Ca and Mg virtually ceased and there were indications that the aerial parts of the plant actually lost K.—Exp. Stat., Mount Edgecombe. J.R.L.

924. Birkett, L. S., Cameron, C., and Gomes, H.
Field experiments with sugar cane, XXV. 2. Growth and ripening studies of the cane varieties B.41227, B. 37161, D.158/41 and D.37/45. II. First ratoon cycle.
Sugar Bull. Brit. Guiana Dep. Agric. **25**, 1957, pp. 46-53.

The curves produced when first-ratoon yields of sugar per acre were plotted frequently showed 2 peaks, and the relationship of these to the maturity of primary and secondary canes is described. There were indications that the first yield peak, but not the second, could be determined from the pol. % cane data.

925. Vijayasaradhy, M., Narasimhan, R., and Nathan, S. J. S.
Experimental studies of the factors controlling flowering in sugarcane. I. Effect of extra light and dark periods and the induction of flowering in canes.
Indian J. Sugarcane Res., 1957, **1**: 151-63, bibl. 14, illus.

Experiments on a large number of early- and late-flowering varieties have shown that they can all be kept in a vegetative condition by providing extra light to extend day length by 2 or 4 hours and can be induced to flower by dark treatment to reduce day length by 4 hours. By applying long-day treatment followed by short-day treatment early- and late-flowering varieties have been induced to flower simultaneously both in the normal season and out of season.—Sugarcane Breed. Inst., Coimbatore.

926. Stehlé, H.
The principal agronomic aspects of the flowering of sugar cane: growth, methods, of cultivation, maturity, deterioration after arrowing, upper point of cutting.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 49-58.

The varietal factor is of primary importance, and since flowering indicates the end of growth, the varieties which flower late or not at all are preferable for long season cultivation. It was found that arrowing did not cause any deterioration so long as the tops of the stalks bearing flowers had not dried. In general, however, it remains true that in years of heavy flowering the sucrose percentage, brix, polarization and purity are generally lower than in years of light flowering. —Centre Rech. Antilles franç., Guadeloupe.

927. Stehlé, H.
Effect of the flowering of sugar cane on its susceptibility to attack by moth borers of the genus *Diatraea*.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 63-5, bibl. 3.

The relationship between flowering and borer attack has been approached from three angles, viz. flowering and the hardness of the stalk, borer infestation in relation to the hardness of the stalk, and, finally, arrowing and borer attack. The ratios in all three cases are similar when (1) the degree of hardness, (2) the percentage of stalks attacked, and (3) the number of borings per stalk attacked are compared for arrowed as against non-arrowed cane. [From author's summary.]—Centre Rech. Antilles franç., Guadeloupe.

928. Rao, M. S. S., Negi, N. S., and Khanna, K. L.
Mid-season spraying of maleic hydrazide to sugarcane.
Indian J. agric. Res., 1957, **1**: 172-3, bibl. 3.

Six varieties were sprayed twice after the flower initiation period with 20 p.p.m. MH at 200 gal./acre. As might be expected the treatment had no effect on flowering and it also did not affect sucrose per cent juice. However, MH increased the weight per stalk in 5 varieties and plant height in 4 varieties. This is thought to be due to reduced respiration and increased conservation of dry matter. Further work is in progress.—Cent. Sugarcane Res. Stat., Pusa.

929. Chakravarti, A. S., and Khanna, K. L.
Pre-harvest spraying of 2,4-D to increase sugar content of cane—further trials during 1955-56.
Indian J. Sugarcane Res., 1957, **1**: 146-50, bibl. 4.

Further confirmatory trials on the effect of pre-harvest spray of 2,4-D (sodium salt) [50 p.p.m. at 60 gal./acre] on sugar content of cane indicate a highly significant improvement. The method has proved consistently effective under the diverse conditions examined. One notable feature, enabling its easy adoption, is that the effect of spray lasts though the entire crushing season. [Authors' summary. See also *H.A.*, 26: 1206 and 27: 2942].—Cent. Sugarcane Res. Stat., Pusa.

930. Rao, N. V. M., and Rao, G. N.
Foliar spraying of "inverted" molasses as a means of improving juice quality—1.
Indian Sugar, 1957, 7: 277, 279, bibl. 3.

In a laboratory trial feeding cut cane leaves with 5% glucose markedly increased their sucrose contents. In a preliminary field trial spraying Co.419 canes in Sept.–Oct. with solutions of glucose, sucrose and molasses (inverted by a method described) improved sucrose contents and purity co-efficients one month later, but showed no effect 4 months after treatment when the cane was 12 months old. [See also *H.A.*, 27: 2943.]—Sugarcane Res. Stat., Anakapalle.

931. Austin, R. B., and Yates, R. A.
A consideration of methods for the assessment of quality of ripening sugar cane.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 44-9, bibl. 2.

Two distinct methods of assessing cane quality are described. One is based on the analysis of the whole cane, as cane brei, using a high speed macerator, and the other on the analysis of the juice extracted from this same brei. The practical values of the two methods are compared with respect to ease of determination and accuracy in estimating quality.

932. van der Pol, C., Young, C. M., and Dekker, K. D.
The determination of certain qualities of individual consignments of cane. III. The significance of brix-free water in the analysis of cane and bagasse samples.
S. Afr. Sugar J., 1957, **41**: 544-8, 552, bibl. 7.

Brix-free water is shown to be a component of the fibre in cane and to have a value of about 30% fibre. Thus, to determine the juice per cent. cane the formula 100 minus 1·3 times dry fibre per cent. cane should be used.

933. Farrar, L. L.
Studies on the ratoon stunting disease of sugarcane in Louisiana.
Diss. Abstr., 1957, **17**: 474-5, being *Publ.* 18,732 of 82 pp.

External symptoms were found to be of little, or no, diagnostic value. Instead, the reddish-orange discolorations in mature nodes and the pink discolorations in immature nodes as described by Hughes and Steindl were found to be reliable. In Louisiana, however, the pink discoloration was also found in the internodes. Studies indicate that the ratoon stunting disease virus is easily transmitted mechanically and will remain infective for 2 days when stored at 70° F. and when diluted with distilled water to 1 : 10,000. Heat treatment studies indicate that the disease can be eliminated if the internal temperature of the stalk is maintained at 49° C. for 2 hours or at 50° C. for at least 1 hour. Prolonged treatments at 50° C. or higher resulted in stand failures. Usually the internal temperature of the stalks at the end of a treatment was still 2 to 5° F. lower than the air temperature in the box. Results of thermal inactivation studies *in vitro* indicate that the virus is inactivated at 50° C. for 20 minutes, 52° C. for 15 minutes and 55° C. for 10 minutes. There are indications that heat treatments materially reduce the amount of latent red rot (*Physalospora tucumanensis*) infection in stalks as well as increasing percent germination of eyes. Inconsistent results were obtained with all chemical tests except the hydrogen peroxide-hydrochloric acid test, which always gave an Adriatic Blue-green colour reaction in the immediate area of the fibro-vascular bundles found below the nodes of cane free from ratoon stunting disease. Frequently a few fibro-vascular bundles would stain in virus-affected tissue, but they were an off-colour and could be easily distinguished. Surveys indicate that the meadow nematode, *Pratylenchus* spp. is found in greater numbers in the roots of cane affected with ratoon stunting disease than in the roots of disease-free cane.

934. STEIB, R. J., FORBES, I. L., AND CHILTON, S. J. P.
The ratoon stunting disease of sugarcane in Louisiana and its control with hot air.
From abstr. in *Phytopathology*, 1957, **47**: 535.

Control of the disease with hot air is now being used on a commercial scale in Louisiana [see also *H.A.*, 27: 2947]. After treatment according to the recommended procedure infected setts produced shoots free of the disease. In other cases, where the disease was present in treated material, the incidence of infection was higher in the progeny setts than in the crop grown from the treated setts. Therefore, treated setts are being treated again in an effort to eliminate the disease. Results have shown that after the disease is eliminated from a variety it regains some if not all of its former yielding capacity.

935. CHU, H. T., AND LIU, H. P.
Investigation of the stunting disease of N:Co.310. [Chinese, with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1956, No. 14, pp. 83-92, bibl. 11.

Surveys showed that the percentage of the N:Co.310 crop infected with ratoon stunting disease was 57·6 in 1954–55 and 72·4 in 1955–56. It was found that in plant, first ratoon and second ratoon crops the disease caused sugar losses amounting to 7·6%, 12·8%, and 16·1% respectively. Experiments showed that the cane yield from healthy setts was 19·5% higher than that from diseased setts, this difference being due to fewer tillers and shorter stalks and not to differences in sugar percentage. When the setts were soaked in water at 50° C. for 2 hours 3·6% of the plants remained diseased compared with 40·5–84·8% of untreated setts. Experiments showed that the yield from plants grown from treated setts was 33·8% higher than that from plants grown from untreated diseased setts and 19·5% higher than that from plants grown from healthy untreated setts. J.R.L.

936. STEINDL, D. R. L.
"Bacterial mottle"—a new disease of sugar cane in Queensland.
Cane Grs' quart. Bull., 1957, **21**: 6-8, illus., and *Aust. Sugar J.*, 1957, **49**: 213, 215, 218, illus.

The symptoms are described of a disease recently encountered in several areas in Queensland. Investigations have shown a bacterium, possibly an *Erwinia* sp., to be responsible. The disease usually occurs in low-lying areas and its spread appears to be associated with flooding. The varieties Q.57 and Trojan appear to be particularly susceptible, but the disease has also been found on Badila, Comus, Eros and Q.45.

937. SHARMA, S. L., SINGH, R. K., AND JHA, H. C.
Possible role of fungicides in the control of red rot fungus *(Colletotrichum falcatum* Went.=*Glomerella tucumanensis* Arx and Muller) of sugarcane.
Indian J. Sugarcane Res., 1957, **1**: 174-5, bibl. 6.

Three fungicides applied as 1% solutions at 200 gal./acre to a crop of Co.453 raised from diseased setts reduced the spread of red rot by the following percentages: Spersul 25·9, Perenox 23·5 and Blitox 18·4.—Cent. Sugarcane Res. Stat., Pusa.

938. KHANNA, K. L., NIGAM, L. N., AND PURI, V. D.
***Chilo tumidicostalis* Hampson—a serious stem borer pest of sugarcane in Bihar.**
Proc. Indian Acad. Sci., Sect. B, 1957, **46**: 75-95, bibl. 10, illus.

Studies on the biology of the moth borer and of its larval parasite, *Apanteles flaviceps*, are described. Surveys undertaken to determine the distribution and intensity of the borer in Bihar have shown that infestations are apt to be most severe in heavy and badly drained soils and in ratoons rather than plant canes. The estimated loss in cane tonnage caused by it in several seasons ranged from 8·2 to 12·6%. Varieties, however, differed considerably in susceptibility, B.O.10 being the most resistant and Co.421 the most susceptible. Losses in sucrose for different varieties in different districts were estimated to range from 10·73 to 48·55%.—Cent. Sugarcane Res. Stat., Pusa.

939. DICK, J.
Recent mealybug investigations.
Proc. 30th annu. Congr. S. Afr. Sugar Tech. Ass., 1956, pp. 122-4, bibl. 3.

A description is given of some experiments which demonstrated that inoculation with the body fluid of mealybugs adversely affected germination and early growth of sugarcane. Investigation of this phenomenon showed the presence of a yeast, associated with the insects, which had some effect but was not as potent as the body fluid itself. The existence of some toxin associated with the insects is suggested as a possible cause of observed symptoms. [Author's summary.]—Exp. Stat., Mount Edgecombe.

940. SINGH, H., KALRA, A. M., AND SANDHU, J. S.
Further studies on the incidence and control of *Pyrilla* in the Punjab.
Indian Sugar, 1957, **7**: 223-6, bibl. 3.

Trials during 1954–56 have shown that spraying sugar cane with endrin gives better and cheaper control of *Pyrilla perpusilla* than using BHC dusts or sprays. It was also found that despite its initial cost a power sprayer was more economical to use than a Maruti foot pump sprayer.—Sugarcane Res. Stat., Jullundur. J.R.L.

941. BENTLEY, J. P. N.
Some recent developments in cane transportation and handling in Natal.
Proc. 30th annu. Congr. S. Afr. Sugar Tech. Ass., 1956, pp. 35-41, illus.

Two new haulage units designed and built in Natal are described with notes on their use and operating costs. The first is an articulated road trailer with a capacity of 25 tons, which can be unloaded in under 3 minutes by specially designed equipment. The second unit consists of two 2-wheeled field trailers coupled together to combine the stability of a 4-wheeled vehicle with the mobility of a single 2-wheeled trailer; drawn by a tractor this unit has transported cane at a cost of

45s. 8d. per ton compared with 58s. 4d. for the old tram truck method.

942. SAMUELS, G., AND LANDRAU, P., JR.
Filter-press cake as a fertilizer.
Sugar J., 1957, **19**(12): 18-19, 79, bibl. 7.

In experiments in Puerto Rico the fertilizing effects of filter-press cake were not outstanding, when it was applied to sugarcane, vegetables, tobacco and root crops. Except for low K its fertilizer value is better than that of animal manures. Recommendations for its use are given.

Tea.

(*See also* 959j, 960h, u, v.)

943. BUBRJAK, I. I.
The effect of group spacing of tea plants on their frost resistance. [Russian.]
Agrobiologija, 1957, No. 2, pp. 106-12.

Tea in Transcarpathia is grown under climatic conditions unusually severe for this crop. In studies on the effect of spacing on hardiness seed was sown singly in rows at distances of 0·25, 0·5 and 1 m., or in clusters of 5, 10, 50 and 100 seeds, or broadcast in continuous 25 cm. wide bands. Both under experimental and commercial conditions a direct relationship was found between the density of sowing and seed germination, and the vigour and frost resistance of the seedlings. Sowing in clusters of 50 or 100 seeds and broadcasting in bands is recommended, together with the use of hardy varieties.

944. PORTSMOUTH, G. B.
Factors affecting shoot production in tea *(Camellia sinensis)* when grown as a plantation crop. I. Some effects of the length of plucking round on flush shoot production.
Tea Quart., 1957, **28**: 3-7, bibl. 5.

An experiment is described in which uniform bushes of T.R.I. Clone No. 4 were plucked to a predetermined standard, at weekly and fortnightly intervals, for some 21 months and the different types of flush shoots regularly harvested, recorded and weighed. Increasing the length of the plucking interval from one week to a fortnight resulted in: (1) A decrease in the total number of flush shoots harvested per bush; (2) an increase in the proportion of shoots with more than 2 leaves; (3) an increase in the mean weight of each individual shoot harvested; (4) a decrease in the manufacturing quality of the crop harvested. There was a net loss of crop with the longer plucking interval. [From author's summary.]

945. PORTSMOUTH, G. B.
Factors affecting shoot production in tea *(Camellia sinensis)* when grown as a plantation crop. II. The influence of climatic conditions and age from pruning on flush shoot production.
Tea Quart., 1957, **28**: 8-20, bibl. 5.

Climatic conditions, of which rainfall is the dominant factor, existing some 2¼ months prior to plucking, appear to predetermine largely the individual weights of the flush shoots harvested. It is suggested that this effect is brought about by increased rainfall increasing the supplies of water and soluble nutrients available at the growing points, thus enabling the shoot primordia to increase in size before active growth begins. Except during drought the numbers of flush shoots harvested were independent of climatic conditions, being apparently determined by an innate periodicity. An increase in the age of the bush from pruning resulted in (1) a decrease in flush shoot number and (2) a decrease in the individual flush shoot weight. [From author's summary.]

946. PORTSMOUTH, G. B., AND RAJIAH, E. S.
Factors affecting shoot production in tea *(Camellia sinensis)* when grown as a plantation crop. III. The time factor and new shoot production.
Tea Quart., 1957, **28**: 21-9, bibl. 3.

During the period December 1951 to February 1952, which covered a maximum number of different plucking treatments, the average time taken for a new crop shoot to develop was 81 days. Differences in development times with different treatments indicate that all crop shoots should be plucked immediately they are ready, if maximum crops are to be secured. Over the whole 11 months, December 1951 to October 1952, during which observations were carried out, the average time taken for the unfolding of successive foliage leaves was approximately 9 days, which corresponded with the plucking interval adopted by estates. Shoot growth rate, as measured by the unfolding of successive leaves, was shown to be related to both sunshine and rainfall. Monthly fluctuations in yield thus appear to be largely climatic in origin. [From authors' summary.]

947. PORTSMOUTH, G. B.
Factors affecting shoot production in tea *(Camellia sinensis)* when grown as a plantation crop. IV. Inter-clonal variations in the effects of apical dominance.
Tea Quart., 1957, **28**: 30-43, bibl. 4.

Prior to terminal bud removal, a highly significant correlation between the numbers of active axillary buds developed and the relative yields of the different clones has been shown to exist. The calculated regression of yield on active axillary bud number indicates that the adoption of a suitable sampling technique, involving counts of active buds, can be used to predict potential clonal yields with an accuracy of about ±10%. Following terminal bud removal there was a marked levelling up in the various parameters recorded and the correlations with yield disappeared. This suggests that neither the operation of plucking, which, like terminal bud removal, must temporarily destroy apical dominance, nor any of the normal cultural operations can have much effect on inherent yield potential. [From author's summary.]

948. ALI-ZADE, M. A.
The effect of irrigation and shading of tea on growth and the size of plucked leaf. [Russian, with Ajerbajdžan summary.]
Dokl. AN AzSSR, 1956, **12**(1): 53-5, from *Ref. Ž.* (*Biol.*), 1957, No. 3, Abstr. 10,394.

Experiments in Azerbajdžan showed that irrigation hastened the growth processes in the tea plant and increased the size of the plucked leaf. Shading with a single layer of muslin combined with irrigation further enhanced growth.

949. HAMZAEV, M. M.
The use of water containing carbonates for irrigating tea in Western Georgia. [Russian.]
Tr. Gruz. n.-i. in-ta gidrotehn. i melior., 1955, 3(16): 81-92, from *Ref. Ž. (Biol.)*, 1957, No. 3, Abstr. 10,393.

River silt with a high calcium carbonate content applied in a tea plantation increased the pH of the soil and reduced the growth and yield of the plants. In the humid subtropics of Georgia the optimum soil reaction for tea lies between pH 4·0 and 5·6. The characteristics of the water resources of the area are described. When water containing carbonates is used for irrigation it should be freed from carbonates and carbonaceous silt by settlement and acidified with nitric acid, or after applying untreated water or silt to tea the soil should be treated with sulphur or peat.

950. ZIMMERMAN, P. W., HITCHCOCK, A. E., AND GWIRTSMAN, J.
Fluorine in food with special reference to tea.
Contr. Boyce Thompson Inst., 1957, **19**: 49-53, bibl. 15.

Comparisons were made of the amount of F in the leaves of tea (*Camellia sinensis*) and ornamental camellias (*C. japonica*). The dry leaves of various commercial brands of tea, composed mostly of young leaves, contained 72–115 p.p.m. F and Chinese tea 131–178 p.p.m. F on a dry weight basis. One sample of fresh leaves of greenhouse-grown tea plants contained 1,530 p.p.m. F on a dry weight basis and the older leaves of ornamental camellias up to 3,062 p.p.m. F. One sample of young leaves of *C. japonica* contained 67 p.p.m. F. Thus both species of *Camellia* were shown to have the capacity to accumulate large amounts of F, especially in the older leaves.

951. DŽEMUHADZE, K. M., AND ŠAL'NEVA, G. A.
Catechins of tea seedlings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 606-8, bibl. 12.

Qualitative and quantitative determinations were made of catechins in the different organs of tea seedlings 20, 40 and 70 days after sowing. In the roots of all seedlings only simple forms of catechins were found, whereas in the stems of older plants an accumulation of the more complex forms occurred and in the leaves of 70-day-old plants *l*-epigallocatechingallate comprised over 72% of the total catechins.

952. DŽEMUHADZE, K. M., AND MILEŠKO, L. F.
Changes in catechins during the rolling of tea leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 859-61, bibl. 10.

During the 3 rollings of tea leaves the content of the various catechins was progressively reduced, and this reduction continued during fermentation and drying. The decrease in specific catechins is discussed, tabulated and graphed. The *l*-epigallocatechingallate showed the greatest quantitative decrease, although this compound still comprised about 75% of the total catechin content. In these experiments it was found that the reduction in tannin content during rolling was wholly confined to the catechin fraction.

953. BOKUČAVA, M. A., SKOBELEVA, N. I., AND DMITRIEV, A. F.
Biochemical changes in aromatic and flavouring substances and the quality of tea. [Russian.]
Doklady Akad. Nauk S.S,S.R., 1957, **115**: 362-3, bibl. 6.

Fermented tea subjected to lyophilic drying at −16° to +2° C. preserved its aroma (84·72% of the volatile aldehydes) to a much greater extent than that dried at 90° C. (20·30%), but the flavour was bitter and unacceptable.

Sundry crops.

(*See also* 959a, 960n, q, 961a.)

954. LEDIN, R. B.
The Florida Sweet Barbados cherry.
Fruit Var. hort. Dig., 1957, **12**: 13-15, illus.

Among clones of the Barbados or West Indian cherry (*Malpighia glabra* or *M. punicifolia*) selected by the Sub-Tropical Experiment Station of the University of Florida one has proved outstanding in many respects and has been named the Florida Sweet Barbados cherry. Among the characteristics of this variety are vigour, cold tolerance, and high yields of fruit of good size, appearance and flavour with an ascorbic acid content ranging from 1,500 to 2,000 mg. per 100 g. juice. [See also *H.A.*, 27: 2987.]

955. BARRAU, J.
L'arbre à pain en Océanie. (**The breadfruit tree in Oceania.**)
J. Agric. trop. Bot. appl., 1957, **4**: 117-23, bibl. 14.

The article briefly covers: origin and distribution; spread of parthenocarpic clones; soil and climatic requirements; production; edible seeds and male-catkin stalks; fermentation of fruit for storage. The specific name *altilis* is used in place of *incisa*. A thorough survey of varieties is advocated. One variety in the Gilbert Islands would probably flourish if planted on other atolls, as it tolerates fairly high soil salinity.

956. UTTAMAN, P., AND KOYAMU, K.
Kerala can step up cashew production.
Indian Fmg, 1957, **7**(3): 19, 22.

Kerala produces 70% of the Indian cashew nut crop, but production could be increased. Various aspects of its culture are discussed and the results of two investigations are outlined. The first investigation showed that nuts could be harvested without loss of weight as soon as the shells become ash coloured but while the "apples" are still green, thus reducing losses through the depredations of birds, bats and squirrels. In the second investigation different forms of cashew were classified into 15 broad types falling within 3 yield categories. In a population of trees only 5·7% were classed as heavy bearers and 18·5% as medium bearers. The remainder were poor yielders producing only light and irregularly formed nuts.—Agric. Res. Stats, Nileshwar and Pilicode.

957. RUBBER RESEARCH INSTITUTE OF MALAYA.
Propagation of *Flemingia*.
Plant Bull. R.R.I.M., 1957, No. 32, pp. 99-101, illus.

The leguminous shrub *Flemingia congesta* has proved useful as a cover crop for rubber, especially when used in conjunction with creeping legumes. Its merits, establishment and management are discussed. Seed germination is improved by treatment with hot water or, better still, with sulphuric acid, and inoculation with, root nodule bacteria is advisable. In seed production plots insects damaging flowers and pods may have to be controlled, and emulsion sprays of Endrex, Dieldrex 15 or DDT are recommended for the purpose. *Flemingia* can also be propagated by cuttings, but this method has not been very successful.

958. Tobias, K. I.
Sapota as an inter-crop in coconut gardens.
Coconut Bull., 1957, **11**: 80-5, illus.

It is suggested that the sapodilla (sapota or chiku) should be more extensively planted among widely-spaced coconuts. Notes on the sapodilla include a mention of several named varieties and a brief description of its propagation by marcotting and by approach-grafting onto 2-year-oid plants of *Mimusops hexandra* and *Bassia longifolia*.

Noted.

959.

a Anon.
A note on the parent locality, parent palm and seednut selection and technique of raising arecanut nursery.
Arecanut J., 1957, **8**: 12-13.

b Anon.
Selection and preparation of land for planting cocoa.
Ghana Fmr, 1957, **1**: 152-6.
Suggestions on soils, shade trees, etc.

c Anon.
The control of mealybug in pineapple cultivations in Jamaica.
Fmr Jamaica, 1956, **60**: 333-4, illus.
Recommendations on spraying with BHC and parathion.

d Anon.
Use of manure-insecticide mixture for termite control.
Indian J. Sugarcane Res., 1957, **1**: 183.
Dieldrin (1·5 lb. actual per acre) mixed with $N+P_2O_5$ when planting cane.

e Bidner-BarHava, N.
Survey of the soils of the banana plantations in the coastal region of Israel.
Ktavim, 1957, 7(2/3): 53-78, bibl. 51, illus.

f Bonnet, J. A.
Importancia de la relación suelo y planta en la interpretación del diagnóstico foliar. (**Importance of the soil-plant relationship in interpreting foliar diagnosis.**)
Rev. Fac. Agron. Univ. Venezuela, 1957, **2**: 5-10, bibl. 8.
A review of Puerto Rican work on sugar cane.

g Brouhns, G.
Note sur la croissance du bananier Gros Michel. (**Note on the growth of Gros Michel bananas.**)
Fruits d'Outre Mer, 1957, **6**: 261-8, illus.
Details of rhizome and sucker growth with suggestions on planting and pruning.

h Cann, H. J., and Eady, C. A.
Destroying bananas by hormones.
Agric. Gaz. N.S.W., 1957, **68**: 397-8, 443, bibl. 1, illus.
By injecting or spraying 2,4-D or MCPA.

i Chapas, L. C., Tinker, P. B. H., and Ziboh, C. O.
The determination of the oil content of oil palm fruit.
J.W. Afr. Inst. Oil Palm Res., 1957, **2**: 230-6, bibl. 3.
Methods investigated and adopted are described.

j Child, R.
Manuring of tea in East Africa.
Pamphl. Tea Res. Inst. E. Afr., **14**, 1957, pp. 10.
Recommendations for various conditions.

k Costa-Rodrigues, L.
Observações a um programa de selecção de café robusta. (**Observations on a selection programme for robusta coffee.**) [English summary 4 lines.]
Rev. Café portug., 1957, **4**(13): 5-9, bibl. 3.
In Angola.

l Dawson, B. C.
Some aspects of the cocoa industry.
Quart. Rev. agric. Econ., Canberra, 1957, **10**: 80-1, bibl. 4.
With special reference to development in Papua and New Guinea.

m (Evers, E.)
Directives pour l'établissement d'une plantation d'hévéas greffés. (**Advice on establishing a plantation of grafted hevea.**)
Bull. Inf. I.N.E.A.C., 1957, **6**: 197-9, bibl. 1.
Choice of seed for rootstocks, germination, soil preparation, planting, spacing, budding, and final thinning.

n Greenhall, A. M.
The food of some Trinidad fruit bats (*Artibeus* and *Carollia*).
Suppl. J. agric. Soc. Trin. Tob., Sept. 1956, pp. 3-26, bibl. 8, illus.
Some 50 fruit and other plants are listed.

o Gutiérrez C., H.
Plantas para el beneficio del café. (**Equipment for processing coffee.**)
Rev. cafet. Colomb., 1957, **13**: 185-98, illus.
For weighing and bulking, cleaning, depulping, fermenting, washing, waste removal and drying.

p Haarer, A. E.
Economic species, varieties and forms of coffee.
World Crops, 1957, **9**: 371-3, 381, bibl. 8, illus.
A review emphasizing the confusion that still exists in classifying *Coffea* spp.

q Hadinoto, R. N. P. K.
Coconut husk as a new raw material for board production in copra producing countries.
Tech. Inf. Circ. S. Pacific Commiss. **25**, 1957, pp. 10.
Has reached pilot-plant stage in Java.

r Havord, G.
Leaf symptoms of deficiencies of calcium and magnesium in cacao.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 27-9, bibl. 5, illus.
Symptoms described and illustrated in colour.

s Himson, A.
A guide to the bud-grafting of rubber in Papua and New Guinea.
Papua New Guinea agric. J., 1956, **10**: 59-72, illus.
Based on 3 years' experience at Bisianumu.

t Horn, D. H. S., and Matic, M.
An investigation of sugar-cane cuticular wax.
J. Sci. Food Agric., 1957, **8**: 571-7, bibl. 15.
Chemical composition.

u Hoyt, C. P.
Parasites and predators introduced into the Pacific Islands for the biological control of insects and other pests.
Tech. Pap. S. Pacific Commiss. **101**, 1957, pp. 40, price 2s. sterling.
Lists, in which pests of plantation crops figure prominently.

v Indian Coffee Board.
Fighting the green bug of coffee.
Indian Fmg, 1957, **7**(3): 11, 14, illus.
With Ekatox 20 W.P., HETP and Folidol E.605.

w Jones, T. A., Maliphant, G. K., and Havord, G.
The nutrition of cacao—A programme of research.
Rep. Cacao Res. I.C.T.A., 1955-1956, 1957, pp. 30-2, bibl. 19.
Details of an elaborate group of experiments and a crop-logging procedure.

x Khanna, K. L., and Rao, M. S. S.
Chemo-therapy of sugarcane setts—use of organo-mercurial fungicide "Aretan" as preplanting treatment.
Indian J. Sugarcane Res., 1957, **1**: 175-6.
Recommended procedure.

y Laíns e Silva, H.
Cafeicultura no Brasil. **(Coffee growing in Brazil.)**
Rev. Café portug., 1957, **4**(13): 12-32.
Planting, intercropping, soil types, production and economics.

z Levett, R. L., and Hobley, F. W.
Report of the use of the Kestrel Fertiliser Dispenser.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **32**: 63-4, illus.
Considerable saving of labour when used in rubber clearings and nurseries.

960.

a M[atthews], A. A.
Poisoning coots.
Cane Grs' quart. Bull., 1957, **21**: 34.
Strychnine bait to control flocks of coots damaging sugar cane.

b Mehra, S. N.
Use of soil moisture tensiometer for regulating irrigation.
Agric. Pakist., 1956, **7**: 332-7, illus.
Economies through its use in sugar cane demonstrated in large-scale trials.

c Menon, K. P. V.
"Cadang-cadang" and root (wilt) diseases.
Coconut Bull., 1957, **11**: 152-6, bibl. 9, illus.
A review comparing symptoms and suggesting control measures.

d Murray, D. B.
The role of shade and fertilisers in the cultivation of cocoa.
J. agric. Soc. Trin. Tob., 1957, **57**: 193-207.
And their interactions discussed.

e Murray, D. B.
Shade trees for cacao.
Rep. Cacao Res. I.C.T.A. 1955-1956, 1957, pp. 45-7, bibl. 8.
Observations on species under trial.

f Nair, C. K. N.
Fertilizers for rubber.
Bull. Rubber Bd India, 1957, **4**(2/3): 7-16, bibl. 13.
Recommendations for nurseries, young trees and trees in tapping.

g Nirula, K. K.
Treatment of compost for control of the rhinoceros beetle.
Coconut Bull., 1957, **11**: 55-8, illus.
Spraying compost heaps with 0·01% BHC.

h Noyes, G. B.
Storage of tea seed.
Tea Quart., 1957, **28**: 55.
68% viable after 6 months' storage in wooden boxes at 40° F.

i Nye, P. H., and Hutton, R. G.
Some preliminary analyses of fallows and cover crops at the West African Institute for Oil Palm Research, Benin.
J. W. Afr. Inst. Oil Palm Res., 1957, **2**: 237-43, bibl. 1.
Nutrients stored in and under "bush" fallows and legume and grass cover crops.

j Orellana, R. G., and Peiris, J. W. L.
The swollen shoot phase of the virus disease of cacao in Ceylon.
FAO Plant Prot. Bull., 1957, **5**: 165-8, bibl. 4, illus.
Presence confirmed, but effects so far mild.

k Paltridge, T. B., and Santhirasegaram, K.
Studies on the nutrient status of some coconut soils in Ceylon. I. The lateritic soils on Bandirippuwa Estate, (A) and (B). 2. The "cinnamon sand" on Horrekelly Estate, (A).
Paltridge, T. B., and Salmond, B.
Idem. 3. The forest soil at Ambakelle, (A).
Bulls Coconut Res. Inst. Ceylon **11, 13, 12** and **14**, 1957, pp. 38, 22, 38 and 9, illus.
Detailed pot studies with a grass and two legumes as test plants.

l Pembroke, E. A.
What to plant?
Cane Grs' quart. Bull., 1957, **21**: 30-2.
Notes on Pindar, Q.57, Q.59, Q.64, Q.66 and Co.475.

m Polanía Sánchez, R.
Enfermedades del cacao (*Theobroma cacao* L.) en Colombia. **(Diseases of cacao in Colombia.)** [English summary ¾ p.]
Acta agron. Palmira, 1957, **7**: 1-70, bibl. 92, illus.
A review covering fungus diseases, mosses, lichens and epiphytes and their control.

n Raghavan, V., and Baruah, H. K.
On arecanut and its scope.
Arecanut J., 1957, **8**: 5-10, bibl. 69.
A review, covering biology of the palm and chemistry and uses of the nut.

o Ramachander, G.
A case of near-albinism in cane.
Indian J. Sugarcane Res., 1957, **1**: 171-2.
Analytical data on healthy and chlorotic plants of Co.421; no response to Fe spray.

p Ramakrishnan, T. S.
Powdery mildew of rubber caused by *Oidium heveae* Steinmaan and its occurrence in South India.
Bull. Rubber Bd India, 1957, **4**(2/3): 3-6, bibl. 8.
Controlled with sulphur dusts or wettable sulphur sprays.

q Ramaswami, K.
Selected references on ber or bor (*Zizyphus jujuba* Mill).
South Indian Hort., 1956, **4**: 60-1, bibl. 38.
Bibliography only.

r Rao, M. S. S., Prasad, R. B., and Khanna, K. L.
Morphological effects of sulpha drugs on sugarcane.
Indian J. Sugarcane Res., 1957, **1**: 173-4, bibl. 20, illus.
For a more detailed account see *H.A.*, 27: 3973.

s Rao, N. V. M., and Rao, W. T.
Use of distillery slops in making composts with sugarcane trash.
Indian Sugar, 1957, **7**: 281-2.
Composts of good composition made quickly.

t Riggenbach, A.
A note on bark cracking of young budded trees of clone PB 86.
Quart. Circ. Rubb. Res. Inst. Ceylon, 1957, **32**: 65.
No evidence that pathogens enter latex-filled bark cracks.

u Roberts, E. A. H.
Oxidation-reduction potentials in tea fermentation.
Chem. Ind. Lond., 1957, No. 41, pp. 1354-5, bibl. 5.

v Roberts, E. A. H.
Oxidative condensation of flavonols in tea fermentation.
Chem. Ind. Lond., 1957, No. 41, pp. 1355-6, bibl. 7.

w Robinet, M.
Observations sur la multiplication végétative du caféier travaux du Centre de Recherches Agronomiques de Bingerville. **(Vegetative propagation of coffee at the Centre for Agronomic Research at Bingerville.)**
Bull. Centre Rech. agron. Bingerville, 1955, No. 10, pp. 67-78, bibl. 8, illus. [received 1957].
Methods of air-layering, grafting and taking cuttings reviewed.

x Rubber Research Institute of Malaya.
Clonal seed collection areas in Malaya and their improvement.
Plant. Bull. R.R.I.M., 1957, No. 32, pp. 91-6, illus.
Including illustrated description of technique for crown budding large seedling rogues.

y Rubber Research Institute of Malaya.
Despatch of planting material.
Plant. Bull. R.R.I.M., 1957, No. 32, pp. 97-8, illus.
Fresh seed, germinated seed, budwood, seedling and budded stumps.

z Rubber Research Institute of Malaya.
Superior processing rubber.
Plant. Bull. R.R.I.M., 1957, No. 32, pp. 83-7, illus.
Preparation of SP rubber, in which vulcanized and unvulcanized latex are mixed before coagulation.

961.

a Sriram, T. A., and Sundararaj, J. S.
An optimum rootstock for custard apple (*Annona squamosa*).
South Indian Hort., 1956, **4**: 134.
Annona reticulata most suitable sp.

b Stevenson, G. C.
Variety improvement in sugar cane.
Proc. 1955 Mtg B.W.I. Sugar Tech., pp. 13-22, bibl. 19.
The past reviewed and the future discussed.

c TOSELLO, A.
Colheita, preparo por via sêca e armazenamento do café. **(Harvesting, dry preparation and storage of coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1957, **32**(364): 8-20.
Procedure described for both dry and wet preparation methods.

d U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
Cocoa beans: world production and trade.
Foreign Agric. Circ. **FCB 1-57**, 1957, pp. 11.
Estimate for 1956–57 908,000 long tons or 11·2% more than 1955–56 crop; trade also up.

e U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
World sugar production and trade, 1956.
Foreign Agric. Circ. **FS 2-57**, 1957, pp. 15.
The 1956 estimate exceeds the 1955 total by 4·6%.

f VAN ZUILEN, E. J.
Uniforme jeugdbemestingsproeven in rubber. **(Uniform manurial trials with young rubber trees.)** [English and Indonesian summaries 18 and 22 lines.]
Bergcultures, 1957, **26**: 321-9.
Layout and recording of 6 experiments described.

NOTES ON BOOKS AND REPORTS.

Books.

962. AGRICULTURAL RESEARCH COUNCIL.
Index of agricultural research 1957.
Cambridge Univ. Press, 1957, pp. 189, 12s. 6d.

The third edition of this index, covering almost all state-aided agricultural research in the U.K., lists projects under (a) subject, and (b) animal or crop. The arrangement of the Subject Index has been changed to conform with the general recommendations of FAO. [For the previous edition see *H.A.*, 24: 3296.]

963. BAKER, K. F. (EDITOR).
The U.C. system for producing healthy container-grown plants.
Manual Calif. agric. Exp. Stat. **23**, 1957, pp. 332, bibl. pp. 13½, illus., $1.

The system of growing plants in containers has been developed by the University of California since 1941 to minimize losses due to disease or soil salinity and to allow for mechanization. This manual covers the ingredients of composts, use of fertilizers, heat treatment and chemical treatment of composts and containers, maintenance of healthy planting stock and nursery mechanization. The editor and some of his colleagues have assembled this information in 17 chapters, and they deal thoroughly with the general principles involved, equipment and management and growers' experiences with the system. It is intended primarily as a reference book for nurserymen and therefore contains a fairly complete index and many cross references. The text is supported by numerous diagrams and photographs.

964. DICK, W. E.
Atomic energy in agriculture.
Butterworth Publications, London, 1957, 5½×9 in., pp. 150, 15s.

The author indicates concisely and in language understandable by the layman the present position with regard to the application of atomic energy in agriculture. He gives details of its many and increasing uses, which are of the utmost importance to horticulture, and in so doing notes its application to the following problems: the production of mutations in fruit plants, as for instance at Balsgård in Sweden and at Kentville, Nova Scotia; tracing the path of fertilizer elements, notably P and K; tagging and tracing movements of insects in the soil or plant; tracing the movement of insecticides and fungicides; control of ripening in fruit and checking sprouting in vegetables such as onions and potatoes.
The whole affords a useful recapitulation of present knowledge.

965. EAST MALLING.
Abstracts and Index East Malling Annual Research Reports 1913-1953, 1957, pp. 175, £1.

How often it occurs that enquiry is made regarding work on a particular subject at a particular place, and generally, although one is well aware that such work was done, it is very difficult to give it a date. Even if the author is known, search may mean thumbing one's way through a large number of annual reports. East Malling—possibly we feel as a self-protective measure—has in the present publication given quick access to work published in the annual reports which cover the first 40 years of its life. What is more, in many cases pointers are given to results achieved. The whole is set out alphabetically with very numerous cross references. The necessity for economy has precluded the provision of an author index, but the authors' names are to be found under the subject index entry according to the papers published. We feel that an apter title might perhaps have been "Annotated Index", since the information is in the form of notes rather than abstracts, but a rose by any other name is welcome and we gratefully doff our hat to the station for the grand idea and to Dr. F. W. Andrews, Commander A. C. Painter and others for the immense labour entailed in its implementation. D.A.

966. EAST MALLING.
Subject Index of papers published from East Malling Research Station in publications other than the Annual Reports between 1913 and 1953, 1957, pp. 58, 5s.

This is a useful and necessary companion to the Abstracts and index of the annual reports [see previous abstract]. The two together offer a master key to past work at East Malling.

967. GARDINER, G. F.
Pictorial plant propagation.
C. Arthur Pearson, London, 1956, 8×5½ in., pp. 152, illus., 18s.

This may well interest amateur gardeners avid for instruction in their pastime, but it is doubtful if the claim to inform professionals is valid. The author was in charge of Bristol University Botanic Garden, maintaining a collection of plants for instructional purposes. In this garden there was always room for plants of peculiar interest to students and thus this book has a special flavour of its own. We would willingly exchange much of the material in this book for more about these demonstrator's plants on which Mr. Gardiner is an authority.

There are five chapters. Propagation by cuttings is handled according to the nature of the material, whether hardy or tender, soft or woody. Layering, of special interest to amateurs, could well have had more notice; the invaluable etiolation method of layering is ignored. The grafting chapter, whilst certainly concise, may mystify beginners, for it seems that if any grafts made in March fail, the failure can be made good by budding in July; the reverse of custom. String, shown for tying grafts, leads to constriction and grafting wax, depicted in use as old fashioned pug, to bankruptcy. The Ministry of Agriculture bulletin containing details of fruit tree rootstocks and their propagation is No. 135 (not 2 as stated here).

There are 146 illustrations, many excellent, but quite 30 of them of no special interest to propagators. Others depict operations posed to suit the camera but only distantly related to practice. Procedures with seeds are very well described and the final chapter on the propagation of conifers, cacti, vines, orchids and bulbs of various kinds goes far towards retrieving the earlier inadequacies. R.J.G.

968. Hollaender, A. (Editor*).
Radiation biology, Vol. III. Visible and near-visible light.
McGraw-Hill Book Co., Inc., New York, Toronto, London, 1956, 9×6 in., pp. 765, bibls, illus., 75s.

This book of basic interest to the horticulturist contains sections dealing with the following, among other, subjects: Energy efficiency in photosynthesis, by Farrington Daniels; The mechanism of photosynthesis, by E. C. Wassink; The absorption, action and fluorescence spectra of photosynthetic pigments in living cells and in solutions, by C. S. French and Violet M. K. Young; Chlorophyll formation and accumulation in plants, by J. H. C. Smith and Violet M. K. Young; Nitrate reduction, by H. Burström; Phototropism, by F. W. Went; Photoperiodism, by H. A. Borthwick, S. B. Hendricks and M. W. Parker; Seed germination, by M. Evenari. The authors survey progress in the fields discussed and cite a wealth of literature for further study by those interested.

969. Hume, H. H.
Citrus fruits.
Macmillan, New York and London, 1957, 9½×6 in., pp. xxi+444, bibls, illus., 73s. 6d. or $10.50.

In his introduction Dr. Hume reminds us that he has previously published two books on citrus fruits—*Citrus fruits and their culture*, as long ago as 1904, and *The cultivation of citrus fruits* in 1926. This second book rapidly established itself as a standard work on citrus, but even the most popular of standard works eventually becomes out of date and ceases to be reprinted. For years past we have been expecting someone to produce a successor to "Hume", little dreaming that when it came it would be by Hume himself. Truly it is a remarkable achievement, and one which will give pleasure to many of the older generation of citrus growers as well as much useful guidance to those just entering the industry.

Although the new book is simply called *Citrus fruits*, it is in fact a revised edition of the 1926 publication. Perhaps partially revised would be a better description, because those chapters devoted to the many species and varieties of citrus, and to propagation, soils, and preparation for planting remain essentially unchanged. By contrast other chapters have been partly or completely rewritten. These include those devoted to rootstocks, cultural practices, fertilizers and method of applying them, and new materials used for controlling pests and diseases. In most cases the chapter headings and subheadings remain the same and this has led here and there to some anomalies. Thus the Mediterranean fruit fly and the nematode causing spreading decline have been tacked on to the section headed "Sucking insects other than scales" and "Tristeza, a virus disease" finds itself under "Bacterial diseases". It is probably inevitable, too, that some developments of interest should have been omitted—the reviewer would have liked, for example, to have seen some mention of nucellar strains either in the chapters on varieties or among the notes on budwood selection—but, in the main, the developments made over the past 30 years in citrus growing, particularly in Florida, are fairly reflected in the changes made in the revised text.

The book, though fewer in pages than its predecessor, is larger in format and thereby gains in appearance. The illustrations include the original line drawings and also many photographs, both old and new, and as before there is an adequate subject index. It only remains to express regret that Dr. Hume should feel it necessary to say that "to a succeeding writer is left the preparation of the next volume". G.K.A.

970. Jazvickij, M.
Manuring orchards. [Russian.]
Moskovskij Rabočij, 2nd edition, revised 1956, 8×5 in., pp. 191, illus., 2.45 roubles.

This is an essentially practical handbook addressed to growers to encourage them to bring about the fruit yield increases decreed by the 20th Party Congress for the 6th five-year plan. After a chapter on the basic characteristics of the soil in relation to the use of fertilizers, the role and effects of carbon (derived from the atmosphere) and of N, P, K, Ca, Mg, S, Fe, B, Mn, Cu, Zn, Mo and Co are considered, and the types of fertilizers, i.e. organic, mineral and bacterial, their properties and preparation for application are described. Then the nutrition of fruit plants in general is discussed, and this is followed by chapters on methods of application, soil preparation and fertilization before planting, and specific treatments for tree fruits, gooseberries, currants, raspberries and strawberries. Appendices provide miscellaneous, and often useful, infor-

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*With the co-operation of Sterling B. Hendricks. The book was prepared under the auspices of the Committee on Radiation Biology, Division of Biology & Agriculture, N.R.C., National Academy of Sciences, Wash., D.C.

mation ranging from the lime content of industrial waste materials to the seed rates for green manure crops. Also among the appendices are alternative fertilizer recommendations for specific crops varied according to soil type and the availability of F.Y.M.
E.U.

971. Krüssmann, G.
Taschenbuch der Gehölzverwendung. **(A pocket book on the uses of woody ornamentals.)**
Paul Parey, Berlin and Hamburg, 1958, 7×4½ in., pp. 129, DM. 10.80.

It is easier to design the layout of parks or gardens than to plan the final planting details. With this difficulty in mind the author, a well-known authority on his subject, compiled these "Instructions on the proper use of woody ornamentals obtainable in the nursery"—as the subtitle of the pocket book runs. Since its contents consist almost exclusively of Latin plant names with a number of symbols after each of them, a great deal of information has been packed into relatively few pages. Room has even been found for some varieties of top and small fruit.

In part I the trees and shrubs are arranged according to their properties, such as time of flowering, flower colour and leaf effects, and in part II according to their uses for certain purposes, such as special soil conditions, shade, hedges, shelter belts, etc. The symbols for the characteristics and requirements of the plants listed are explained in the introduction and repeated a second time on a book marker which is attached to the head band. There cannot be many horticultural books printed abroad, which make such small demands on the linguistic talent of the English reader.
V.H.G.

972. Leemans, J. A., and Nannenga, E. T.
A morphological classification of raspberry varieties.
Rasbeschrijvingen Inst. Vered. Tuinbgew. **2**, 1957, 10½×8 in., pp. 140, bibl. 100, illus., Fl. 25.

This book has been written in English and it is copiously illustrated with excellent photographs of the 54 raspberry varieties described. Its large format makes it rather difficult to handle in the field, where its paper cover would also be a disadvantage. This seems a pity because the book could easily have been made smaller by reducing the background in the photographs and by using more fully the space available for print. The writers are to be congratulated on having so clearly defined and illustrated the various diagnostic characters they use in delineating the varieties. The varietal descriptions, in general, seem excellent, and although one would not always agree with the assessment of such characters as spininess, it is appreciated that considerable phenotypic variation occurs in raspberry varieties in different localities.

The composing of a key to the identification of commercial varieties of any crop is almost invariably extremely difficult, largely because varieties often differ from each other in a number of small and ill-defined characters, especially when several types have been bred from a common stock. The raspberry is no exception to this, and the reviewer found certain difficulties in using the "Identification Key". In item 12 in the key it is not clear whether "very late" refers to the general fruiting season or to the autumn crop. Moreover, no explanation is given for the inclusion of occasional numbers in brackets in the key. The authors, however, emphasize that the key is to be regarded as an adjunct to the varietal descriptions rather than as a means by itself of certain identification. The reviewer noted many spelling mistakes; such errors as Madewaska as the heading for the description of the variety Madawaska might with advantage have been avoided. These criticisms are, however, relatively minor, and the book provides an excellent and much needed descriptive account of raspberry varieties and their synonymy.
R.L.K.

973. National Academy of Sciences, Washington.
Proceedings of the first international conference on the use of antibiotics in agriculture, 1955.
Publ. nat. Acad. Sci. and nat. Res. Coun. Wash. **397**, 1956, pp. 278, bibls.

The proceedings consists of a series of review articles ranging over a wide field, and including one entitled "Improving plant health with antibiotics" by W. J. Zaumeyer.

974. Pearce, S. A.
Climbing and trailing plants.
Collingridge, London, 1957, 8½×5½ in., pp. 142, illus., 25s.

The title need not be taken too literally for it is stretched to include a number of plants which have no difficulty in standing without visible means of support; thus the scope is enlarged to advantage and a number of decorative shrubs are brought to notice that otherwise might be missed. Reference is made to very many suitable plants, some 500 species and varieties in fact. Cultural and other notes on the species are liberal and lengthy. Horticultural varieties ("cultivars" to some of us) are mostly excluded from the full treatment and have to be content with a reference to colour. The pruning requirements of the various clematis groups, here 8, a well-wrapped mystery to many people, are usefully clarified. There are informative chapters on all the necessary cultural operations and lists of plants for various situations. The book is well illustrated. It can be recommended.
G.St.C.F.

975. Rünger, W.
Licht und Temperatur im Zierpflanzenbau. **(Light and temperature in the culture of ornamental plants.)**
Paul Parey, Berlin and Hamburg, 1957, 9×6½ in., pp. 163, bibl. 87, illus., DM. 16.80.

Light and temperature in their relation to plants have been studied extensively in recent decades, but only to a limited extent have the results of these investigations been applied in the cultivation of ornamentals on which they have so much bearing. In the circumstances, any attempt to help the grower to catch up with scientific advance must be welcomed. In presenting a coherent picture of our knowledge and of the principles underlying its horticultural application the author has written a useful and readable book. Two theoretical chapters (pp. 8-49) are followed by discussions of various treatments (pp. 49-67) and then by details of the requirements of individual plants (pp. 57–157).

It is a reflection on the physiologists, and not on the author, that the space devoted to cyclamen is only a fraction of that devoted, for instance, to *Euphorbia splendens*. The photographs illustrate clearly the points they are meant to make. V.H.G.

976. Searle, S. A., and Machin, B. J.
Chrysanthemums the year round.
Blandford Press, London, 1957, 8×5½ in., pp. 273, bibls, illus., 25s.

This is not just another manual on chrysanthemum growing but a work of considerable scientific interest. It shows how the chrysanthemum, usually regarded as an autumn or winter flowering plant, may by certain techniques be so controlled as to bloom, as the authors put it, on any given day of the year. Whether chrysanthemums blooming with the daffodils in spring or with the roses in June are not a trifle misplaced is neither here nor there. The times are out of joint these days anyway.

The first part of the book deals with the production of chrysanthemums for bloom at the normal times, showing how the latest scientific knowledge may be applied. To take one operation—watering. This entails recording the soil moisture account, measuring the soil moisture, use of soil moisture tensiometers, knowledge of osmotic pressure and transpiration rates, trickle irrigation, calculation of water required, tables, diagrams. Many growers who annually produce first class blooms apparently by the light of nature and a little common sense may wonder whether it is worth while. Worth it or not it is of compelling interest to read about here.

Part II gets down to all the year round production. This is largely a matter of temperature control, lighting and darkening, dates for taking cuttings, the choice of "light efficient" and "light inefficient" varieties and other factors which have to be considered according to the kinds being grown. Much of this work originated in North America where the system is now well established as an economic success.

Part III discusses the environment and its effects. It is largely a well-documented review of modern research, most of the references being to American publications. An appendix entitled "Response Groups" shows the number of weeks to flowering from the commencement of short days at a night temperature of 60° F. for a number of varieties, grouped by number of weeks from 8 to 15. There are over 300 of these, all American, which makes the British list of 15 look somewhat meagre, though it certainly shows how fully established the system is in the U.S.A. compared to here. There is also a list of "thermozero", "thermopositive" and "thermonegative" varieties. The best way to find out what this means is to buy the book.

The line drawings to illustrate points of technique are useful. The coloured and other plates of single blooms or of varieties blooming en masse, usually in April, assuming the camera cannot lie, embellish the book but are hardly likely to distract the reader who has really got his teeth into the text. G.St.C.F.

977. Seitzer, J., Schüle, H., and Wenck, F.
Farbtafeln der Birnensorten. **(Pear varieties in colour.)**
Verlag Eugen Ulmer, Stuttgart, 1957, 6×8 in., pp. 102, DM. 11.80.

The little book follows the pattern of its companion volume on apple varieties which was noticed in *H.A.*, 27: 3008. It contains colour plates and descriptions of 44 pear varieties, including 4 perry pears, and line drawings of 5 quinces. The varieties, many of them grown outside Germany, are arranged according to time of ripening.

978. Thiem, H.
Die Abbaukrankheiten des europäischen Obstbaues. **(Decline diseases of fruit plants in Europe.)**
Bayerischer Landwirtschaftsverlag, Bonn, Munich and Vienna, 1957, pp. 174, bibl. 364, illus., DM. 23.

Among decline diseases can be counted all such disorders as are due to nutrition and environment including climatic factors. In the present book the author is predominantly concerned with those due to virus infection.

A fairly brief discussion of the characteristics of virus diseases, their method of spread and testing, including the use of indicator plants, is followed by a description of the symptoms commonly observed in different virus-affected fruit plants. The author then deals with the diseases according to the part of the plant attacked. Most of them concern the leaf and are subdivided into mosaic types and those that tend rather to cause actual malformation, both types again being subdivided. Next come diseases that attack the flower such as green petal in strawberry. Diseases attacking shoots, twigs and the different parts of the framework of the fruit tree or bush follow and finally viruses affecting the fruit itself.

Three short sections, covering pp. 86–92, are devoted respectively to nutritional disorders, disorders of ecological or climatic origin and to the curious disorders that afflict cherry seedling rootstocks. Finally the author considers the present position *vis-à-vis* viruses in the nursery and the appropriate action for the final elimination of virus infection, in which the nurseryman, plant breeder, virologist and quarantine officer have their respective parts to play. Fifty-four pages contain black and white illustrations with explanatory legends of named virus phenomena in fruit plants. D.A.

979. Unwin, C. W. J.
Gladioli and dahlias.
Collingridge, London, 2nd edition, 1956, 7½×5 in., pp. 128, illus., 10s.

Present day knowledge and changes in popular taste have called for a drastic revision of this book after only seven years. As now presented it can fairly claim to be more or less up to the minute in news and views of its selected subjects. The two plants are dealt with in separate sections, each containing chapters on routine cultivation, propagation, and breeding. The gladiolus being so much more a competition plant has an additional full chapter on growing for exhibition, by which the aspirant will discover that there is a good deal more to it than buying a bag of corms at Woolworth's and hoping for the best. Gladioli are classified here as belonging to one of three groups, large-flowered, primulinus and Colvillei, though new groups known as "miniature" and "butterfly" are on the way up.

In dahlias there is no such restraint. These are divided into 14 classes and a number of sub-classes, the latter being mainly a question of size. The author's method of spelling "collarette" is his own. He prefers "collerette" which he uses throughout and in the index, having first informed us that the name is derived from "collar", alluding to an inner ring of small petals. But as one of the foremost growers and breeders in the country he can surely be allowed an idiosyncrasy or two. The book is well conceived, well illustrated and altogether forms a highly authoritative guide to the successful cultivation of these two plants.

G.St.C.F.

980. Went, F. W., and others.
The experimental control of plant growth.
Chronica Botanica, 1957, **17**: i-xvii and 1-343, 9½ × 6 in., bibls numerous, illus., 60s. or $7.50.

This book was announced by the publishers well in advance of its ultimate appearance and many others, besides the reviewer, had no doubt been keenly looking forward to the opportunity of reading it, to find out just what had been going on within the fabulous "Phytotron". The curtain has now been drawn aside by the publication of Professor Went's book, which contains a detailed description of the Earhart Plant Research Laboratory, a great deal of information on particular aspects of the growth of a wide range of species, and a general discussion of the plant environment, biological processes, and experimental methods. Could one wish for more, even for £3? Perhaps not, yet despite all the tributes that must undoubtedly be paid to the magnificent concept and execution of the laboratory from a technical viewpoint, and the fascinating work that has been done therein, the first seven years of the Phytotron's life do not seem to have taken us very much nearer to a full understanding of the effects, or even the precise measurement, of the essential environmental parameters, namely energy incident on the plant, temperatures within its tissues, vapour pressure at its leaf surfaces, and the moisture relations between soil particles and root hairs. Work still seems to be mainly based on a measurement of those parameters at one remove from the plant, i.e. light at plant level, temperature of the air, relative humidity of the air mass, and the general moisture status of the whole bulk of soil. One hopes that the incomparable opportunities in Professor Went's laboratory will one day be used for a more detailed study of those parameters, and for the calibrations which could be so helpful to other workers with less elaborate installations.

With those remarks, which are not intended as destructive criticism, it is a pleasure to turn to the many aspects of the book which are wholly admirable. The description of the design, instrumentation and operation of the laboratory are clear and helpful, making a convincing argument for Professor Went's contention that the best way of controlling environment is to arrange for a generous flow of air through the experimental space, using the standard methods of air-conditioning for heating, cooling, drying and wetting the air. It is unfortunate that this system is so expensive, but the book will provide extremely useful ammunition for any experimentalist who is seeking financial support for environmental control equipment. This is not the place to consider how the funds available for botanical and agronomical research should be apportioned, or to discuss the relative merits of a few phytotrons or a much larger number of simpler, less expensive, installations. No doubt there is a place for both, but one may guess that not every scientist will prove capable of administering a phytotron and ensuring that its output of original work is commensurate with the cost of building it and keeping it in use. The book certainly provides a complete justification for this particular Phytotron.

There is a wealth of new and valuable data on the responses of many plants to physical factors of the environment. For instance, after taking up all the references on the tomato plant (a process which revealed some repetition) the reviewer felt constrained to recast his whole series of lectures on that interesting plant, and the Californian findings on other species are equally stimulating. In the ecological field the work is throwing important light on the mechanisms whereby the distribution of species may be determined, whilst there are many findings of considerable importance to the agronomist and geneticist. The book may well be a stimulus to work in a wide range of different disciplines and fields, and will undoubtedly prove to be an invaluable source of data for many types of worker. Some of Professor Went's conclusions may not find ready acceptance by plant physiologists, but they are nevertheless presented with a wealth of data and will no doubt provoke much argument and rethinking of some of the old-accepted concepts on the relative importance of environmental factors and internal processes as determinants of growth and yield.

As was to be expected from *Chronica Botanica*, the book is well produced and free from typographical errors. A few rather obscure references from one part of the book to another, and (relatively unimportant) omissions from the index, will no doubt be corrected in due course. The book needs no detailed recommendation—its scope and contents will serve themselves to recommend it as a unique contribution to all who are concerned with plants, their response to the environment, and the methods of studying those responses. This book, the first devoted solely to the study of plants under controlled environments, may well mark the beginning of a new range of publications in the same way that the Earhart Plant Research Laboratory marked the beginning of a new era in research facilities.

J.P.H.

Annuals and reports.

981. Boskoop (Dorsman, C.).
Jaarboek Proefstation voor de Boomkwekerij te Boskoop 1956. (**Yearbook of the Boskoop Tree and Shrub Nursery Experimental Station for 1956**), pp. 184, illus.

The research reports are grouped under propagation, soils and manures, pests and diseases, breeding and selection, chemical weed control, storage and forcing of woody ornamentals. [See also separate abstracts in Floriculture section, etc.]

982. Ceylon (Chandraratne, M. F.).
Administration Report of the Director of Agriculture for 1956, Part IV—Education, Science and Art (C), 1957, pp. 91, Rs. 2.30+35 cents postage.

Tea Research Institute: clonal trials; studies on the relationship between rate of growth flush and total yield of clones; blister blight, nematodes, mites and nettle grubs. *Rubber Research Institute:* clonal trials; fertilizer and latex studies. *Coconut Research Institute:* soils; vinegar production from fermented toddy; breeding; pollination. *Division of Botany:* control of *Cyperus rotundus* and *Imperata cylindrica*; fertilizer trials with vegetables. *Agricultural Research, Northern Division:* chilli selection, varieties and manuring; onion manuring. *Division of Sugarcane Research:* breeding; varieties; manuring. *Division of Chemistry:* curing of cacao. *Division of Entomology:* control of *Helopeltis ceylonensis, Empoasca devastans* and *Scirtothrips dorsalis* on cacao. *Division of Plant Pathology:* citrus decline; cacao sickle leaf; betel diseases; papaw virus. *Division of Horticulture:* cacao clonal trials; citrus decline; pineapple shading, weed control, mealybug control, mulching and hormone spraying to regulate fruiting; papaw varieties. *Tobacco Division:* varieties, manuring and extension schemes. *Botanic Gardens:* orchid breeding.

983. CITRUS EXPERIMENT STATION, SHIZUOKA PREFECTURE.
Report of the Citrus Experiment Station from April 1, 1954, to March 31, 1956, 1956, pp. 124, illus.

This publication consists of 58 short progress reports [in Japanese] on various aspects of work carried out at the Experiment Station and at 3 branch farms. They cover breeding, pest and disease control, storage, and fertilizer and other cultural trials. In addition to citrus, work is reported on persimmons, peaches, pears and chestnuts. J.R.L.

984. C.S.I.R.O., AUSTRALIA.
Eighth Annual Report of the Commonwealth Scientific and Industrial Research Organization for year 1955-56, Canberra, 1956, pp. 179, 10s. 6d.

Work is reported under the following, among other, headings: *Plants:* Microbiology.* Fruit investigations.* Oil crops: conditions for safflower culture. Tobacco investigations.* General chemistry: nutrient availability; lead toxicity may be a contributory factor in the frenching of tobacco. Nutrition. Toxicology. Physiology. Biochemistry. *Irrigation.* Entomology:* Biological control of weeds and pests. *Food:* Constituents, storage metabolism and sterilization of fruits. *Atmospheric physics:* Frost prevention by wind machines. Artificial rain formation.

985. CYPRUS. (ALLAN, W.)
Annual Report of the Department of Agriculture for the year 1956, Nicosia, 1957, pp. 57.

Citrus stocks are being produced in increasing numbers at the following sub-tropical stations: Govt. Farm, Morphou, Zakaki, Zylotymbu, as also at Famagusta and Lefka. Similarly the two main deciduous fruit stations at Galata and Saitta are largely devoted to the production of fruit stocks. At the Tobacco Station, Akradhes, variety trials, production of stock seed and trials on various methods of tobacco rearing are the main functions. New virus-tested, nucellar strains of budwood of oranges and lemons from the U.S.A. are ready for trial at Morphou. Collections are being established of vines, carobs and pistachio nuts. The addition of water to young carob seedlings was in one year much more favourable than N or P fertilizer applications. Of 20 imported tomato varieties Kfar Shalem from Israel produced the earliest and heaviest crops. 2,4,5-Trichlorophenoxy acetic acid showed much promise against the shrubby weed *Zizyphus lotus.*

986. DIRECTIE VAN DE LANDBOUW, THE HAGUE.
Tuinbouwkundig Onderzoek, Jaarverslag 1956. **(Horticultural Research, Annual Report 1956.)**
Ministry of Agriculture, The Hague, 1957, pp. 348.

Brief progress reports are given of numerous research projects pertaining to horticulture throughout the Netherlands. The reports are classified under general subjects, fruits, vegetables, cut flowers and pot plants, raising woody plants, herbs and tobacco, seeds and bees.

987. FLORIDA.
Annual Report of Florida Agricultural Experiment Stations for the Fiscal Year ending June 30, 1956, pp. 351, illus.

Work in progress in the departments, branch stations and laboratories is summarized. Aspects of growing and marketing citrus, vegetables, ornamentals, tobacco, pecan, tung, strawberries, vines, fibres, avocadoes, sugar cane and mangoes are included in the studies. [See also separate abstracts.]

988. GHANA.
Annual Report of the Department of Agriculture for the year 1954-55, 1957, pp. 53, 3s. 6d.

There is brief reference (pp. 11–13) to variety tests and other trials on various crops, including bananas, fibres, oil palms, pineapples, tobacco and vegetables, and to work on pests and diseases (pp. 17–18). The work of the Cocoa Division is described in more detail (pp. 24–34); its main activities including the swollen shoot disease control and replanting campaign; the capsid control campaign; investigations on the control of black pod disease, termites and rodents; fertilizer, variety and other trials carried out in conjunction with W.A.C.R.I.; and the distribution of improved planting material.

989. GLASSHOUSE CROPS RESEARCH INSTITUTE,
Annual Report 1954-1955, Littlehampton, 1957, pp. 107, bibls, illus.

This report from what was the Cheshunt Research Station, now known as the Glasshouse Crops Research Institute and rehoused in new premises at Littlehampton, Sussex, is the last to be prepared by the retiring Director, Dr. W. F. Bewley. The site, buildings and installations are described, and recent work on cucumbers, tomatoes, mushrooms, carnations, red spider mite and spray residues is reported. Certain items are abstracted separately.

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* See separate abstracts in appropriate sections.

990. HONG KONG.
Annual Departmental Reports by the Acting Director of Agriculture, Fisheries and Forestry, Hong Kong, for 1955-56, pp. 95, illus., H.K. $4.

In a trial with 12 different rootstocks for tangerines, best growth was made on local lemon (Chinese lime), and very good growth on Calamondin, Rangpur lime and rough lime. Successful control of African giant snails was obtained with metaldehyde and "arsinette" baits. In a cabbage fertilizer trial using compost alone or combined with nightsoil, inorganic balanced fertilizer, organic balanced fertilizer, ammonium sulphate or peanut cake, the largest increase in yield was obtained with compost plus peanut cake.

991. ILLINOIS. (HOWARD, L. B.)
Research progress at the Illinois Agricultural Experiment Station. Report for 1954-1956, Urbana, 1957, pp. 143.

Work is briefly reported in the following: *Horticulture* (pp. 97–102). A *Fusarium*-wilt-resistant tomato variety called Blackhawk. Composition, quality and respiration of tomato fruits. Rose and carnation nutrition. Equipment for mist propagation. Breeding grapes for resistance to black rot (*Guignardia bidwellii*). Soil management in sloping apple orchards. Anatomical and morphological studies of frost-damaged apples. *Plant Pathology* (pp. 103–11). Control of fireblight on apples with copper sulphate and antibiotics. Control of asparagus rust with dinitro-sec-o-butylphenol and zineb. Factors influencing infection of beans with tobacco mosaic virus. Two new antibiotics.

992. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarverslag 1956, Instituut voor Tuinbouwtechniek, Wageningen. **(Annual Report of the Institute for Horticultural Engineering, Wageningen, for 1956),** pp. 60, illus.

The following are some of the results reported in the research section: The porosity of flower pots from different sources varies, and when the less porous types are plunged in peat too close together they may not be able to take up sufficient moisture. Supplementary lighting given for about 2 months to Ailsa Craig tomato seedlings produced earlier yields and better returns. Tomato seedlings grew satisfactorily for 7 weeks in an artificially lighted chamber with heat provided from the lamps. Continuous lighting applied to tomato seedlings was also satisfactory. Black plastic mulching improved the growth and quality of frame cucumbers. In comparing the effect of different types of heating in tomato houses, heating by thin pipes gave the best results. Labour efficiency studies have been carried out on the picking of apples, beans and strawberries and the filling and stacking of boxes for mushroom growing.

993. I.R.S.I.A.
Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture. Rapport annuel. Exercise 1956. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1956),** Brussels, 1957, pp. 217.

Brief summaries are included of research programmes on fruit growing (nutrition, breeding, scab control and pruning), medicinal plants, vegetable growing (particularly chicory) and tobacco growing and curing.

994. JERSEY.
Annual Report of the States Experimental Station, Howard Davis Farm, Trinity, Jersey, for 1955, 1957, pp. 65.

Variety trials with lettuce, early cauliflower, spring cabbage, broccoli, and strawberries under Dutch lights. Overwintering trials with early cauliflower. Mobile glasshouse cropping rotations. *Studies on Didymella lycopersici stem rot of tomatoes.* Zineb and captan proved less phytotoxic and dangerous to use against stem rot than ethyl mercuric phosphate but gave less satisfactory control. None of the commercial varieties tested proved resistant. *D. lycopersici* in infected haulms may be destroyed by efficient composting in a special plant; in small-scale composting only very careful treatment will eliminate all the fungus. Treatment with 2,4,6-T made tomato seedlings more susceptible to stem rot [see *H.A.*, 27: 2534]. *D. lycopersici* may be transmitted by seed to a small extent.

995. KENYA.
Annual Report of Kenya Department of Agriculture, 1956. Vol. I, 1957, pp.77, sh. 4.

A brief summary of investigations includes: *Coffee:* control of *Leucoptera* spp., *Antestiopsis* spp., *Leucoplema dohertyi* and coffee berry disease; trials on mulching, nutrition, weed control and spraying with copper, non-copper and hormone preparations to prevent leaf fall. *Pyrethrum:* breeding; pollination studies; trials on stripping, nutrition and irrigation. *Sisal:* trials on nutrition, irrigation, planting materials, spacing, cutting and weed control. *Sugar cane:* varietal, fertilizer and drainage trials. *Horticulture:* onion growing from sets; pineapple fertilizer trials; citrus irrigation; windbreaks in apple orchards; plum fruit thinning; tomato varieties for processing; pineapple mealybug control; banana thrips control; termite control in sugar cane.

996. MADRAS.
Administration Report of the Agricultural Department for the Fasli Year 1955-56, 1957, pp. 356, illus., 12s. 9d.

In the research section the following projects are among those briefly reported: forms of N for sugar cane and bananas; control of plum fruit fly (*Chaetodacus* sp.), pests of stored products, the castor semilooper (*Achoea janata*), and sugar cane borer; disease control for bananas, vegetables, citrus and turmeric; varietal and cultural trials with castor, coconuts and other oilseeds, sugar cane, mangoes, vines, citrus, bananas, apples, plums, jackfruit, custard apples, sapodillas, papaws, pineapples, cashew, ginger and black pepper; weed control studies. Work at the agricultural research stations includes: mulching of ginger, varietal and rootstock trials with apples, dormancy breaking in apples, sugar cane varietal trials, time of planting and ratooning of sugar cane, cashew propagation, leaf composts from jackfruit, gliricidia and sesbania, and coconut cultivation, manuring and breeding.

997. MARTIN-LUTHER-UNIVERSITÄT, HALLE-WITTENBERG. (HOFFMANN, W., AND OTHERS.)
Instituts- Berichte der Landwirtschaftlichen Fakultät. (**Reports of the Institutes of the Agricultural Faculty of the Martin-Luther-University, Halle-Wittenberg.**)
Reprinted from *Wiss. Z. Martin-Luther-Univ. Halle-Wittenb., math.-naturw. R.*, 1956/57, **6**: 481-527, bibls.

Brief reports, which cover the period since the end of the war, include those of the Institute of Fruit and Vegetable Growing and of the Phytopathological Institute.

998. MICHIGAN.
Ninety-fifth Annual Report of the Secretary of the State Board of Agriculture, State of Michigan, and the Sixty-ninth Annual Report of the Agricultural Experiment Station, July 1, 1955, to June 30, 1956.
Mich. St. Univ. Publ., 1957, **51**(12): 1-408.

Brief reports are given (p. 135) on labour saving in apple picking and orchard transport, controlled atmosphere storage for Jonathan and McIntosh, brown rot control in peaches, chemical treatment for increased tomato yields and a new bush bean variety.

999. MINISTRY OF AGRICULTURE, NORTHERN IRELAND.
The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland, 1955, 1957, Vol. **5**, pp. 197, 6s. 6d.

Part I. Articles describing recent research carried out under the direction of the Ministry; with the exception of one [see abstr. 296] these are on agricultural subjects. *Part II.* Annual reports from the research divisions of the Ministry; Pre-blossom applications of 0·2% BHC or captan used alone did not result in any marked increase in *Metatetranychus ulmi* populations on apples, but the combination of the two did so. Aldrin, and particularly dieldrin, dips retarded curd development in spring-planted cauliflowers. A soil testing technique has been devised which allows the presence of *Plasmodiophora brassicae* in a field to be determined before planting. Rose rust was controlled most effectively by Tulisan and oil-bordeaux, and black spot of roses by oil-bordeaux, captan, Tulisan, Fermate and Spersul+Fermate. *Part III.* A report on agricultural experiments and demonstrations includes the following work at the Horticultural Centre, Loughgall, Co. Armagh: brussels sprouts and tomato variety trials; apple scab control trials with phenyl mercury chloride and S.R.406; apple storage experiments on the use of plastic bags and on the effect of spray treatment on the development of storage rots; orchard sward trials.

1000. NAALDWIJK.
Jaarverslag 1956, van het Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk. (**Annual Report of the Research Station for Vegetable and Fruit Growing under Glass, Naaldwijk, for 1956**), pp. 168, illus.

The arrangement of the Annual Report has been slightly altered and articles on general problems precede research results under each section. *Trickle irrigation* trials continued with tomatoes and started with carnations. *Manuring* with artificials for peaches, tomatoes, and cauliflowers, and with various forms of organic manure. *Cultural trials* with flowers (in particular freesias), tomatoes (including grafting on stocks resistant to corky root, and ring culture), lettuces, cucurbits, eggplants and sweet peppers (grafting). *Physiological studies* on lettuce seed vernalization, lettuce bolting, root development in lettuce and tomato, the effect of light on P uptake by young tomato plants, sugar-urea foliar sprays for tomatoes, artificial illumination for tomatoes and lettuces, shading for chrysanthemums. *Fruit set and growth substance experiments* on tomatoes, melons, cucumbers, onions and glasshouse plums. *Breeding and variety trials* on peaches, plums, grapes, tomatoes, freesias, eggplants, capsicums, lettuces, endive, cucurbits, beans and sprouts. *Storage and packing* of melons, tomatoes, cucumbers and grapes. *Pest, disease and weed control* for various crops.

1001. N.A.A.S. (LUDDINGTON).
Report of the Luddington Experimental Horticulture Station, Stratford-on-Avon, Warwickshire, for 1956, 1957, pp. 78.

Fruit section: Progress report on National Fruit Trials. Apple planting systems. Control of *Tetranychus telarius* and big bud mite on blackcurrants. Control of American gooseberry mildew. Control of botrytis fruit rot and powdery mildew on strawberries. A comparison of tree-tying materials. *Vegetable Section:* N.I.A.B. variety trials on onions, lettuces, carrots, spring cabbage, early cauliflowers, brussels sprouts, and N.V.R.S. trial with onions. Lettuce resistance to mosaic. Control of cabbage root fly. Weed control in peas. Irrigation of cauliflowers, carrots, lettuce and celery. Manurial and cultivation trials with vegetables. *Intensive Cultivation Section:* Lettuce propagation and planting dates. Lettuce varieties and uncovering dates. Dwarf french bean varieties and sowing dates. Self-blanching celery spacing/nitrogen levels and lifting dates. Lettuce varieties for autumn cropping. *Glasshouse Section:* Cyclamen depth of potting. Production of summer-rooted late-flowering chrysanthemums. *Flower Section:* Gerbera nutrition, strains and propagation. Time of striking and planting outdoor chrysanthemums. *Chrysanthemum maxima* variety trial. *Meteorological Experiments:* The effect of various types of shelter screen on yield, quality and earliness of lettuce.

1002. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Annual Report N.I.A.E. 1955-56, Wrest Park, Silsoe, Beds., 1957, pp. 71, plus supplements.

The report of the Horticultural Engineering Department covers 7 pages and consists of explanatory notes on the progress of numerous projects. Eleven of such projects are classified under the heading Environmental control and glasshouse investigations; 6 under Tractor and cultivation investigations; 8 under Fruit crop spraying investigations; 1 under Vegetable washing and 1 under Bulb harvesting. The close liaison with the N.A.A.S. [National Agricultural Advisory Service] Experimental Horticulture Stations is very noticeable.

Among the supplementary articles is one which concerns the draught of a hoe blade.

1003. NEW SOUTH WALES.
Report of the Department of Agriculture New South Wales for the year ended 30th June, 1956, 1957, pp. 111, illus., 9s.

Division of Plant Industry. Tobacco breeding for blue mould resistance, irrigation experiments. Hop yield and variety trials. Vegetable breeding and variety trials. *Division of Horticulture.* Cool storage of citrus. Banana planting distances, fruit waxing. Apple and pear rootstock trials, scab-resistant apple varieties. Peach breeding, pruning and thinning, foliar application of urea. Plum rootstocks, fertilizing, rust control. Internal breakdown of apricots. Cherry varieties and stocks. Almond pollination. Freezing of peaches and berry fruits. Plastic materials used for bud tying. Vine fertilization. *Division of Science Services.* Disease and pest control on vegetables, fruits and ornamentals.

1004. NIGERIA.
Annual Report on the Department of Agricultural Research, Federation of Nigeria, for the year 1954-55, 1957, pp. 24, 9d.

In cacao progeny trials the hybrid T38 × CF176 gave the highest yield (1,966 lb. wet beans/acre). Black-pod disease of cacao was successfully controlled by 1% carbide-bordeaux or 0·4% perenox. Cacao seedling die-back and wilt, concentric blotch of citrus and capsid pests of cacao are being studied.

1005. PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
Jaarboek, 1956. **(Yearbook of the Plant Pathology Service, Wageningen, 1956.)**
Meded. Plziekt. Dienst. **130**, 1957, pp. 222, illus.

Horticultural crops: cold insecticidal dips increased narcissus yields by 50%, and hot water treatment by 25–30%; plants in plots treated with D-D or chloropicrin continued to show the best growth in a study of nursery soil-sickness; zineb (at 0·3–0·5%) gave excellent control of *Peronospora sparsa* on roses; hot water treatment of raspberry root cuttings has given promising results against stunt virus; 5 sprays of 3·5% maneb plus zineb gave good control of bean rust (*Uromyces phaseolorum*); grey mould on peony has been controlled by spraying with copper at bud burst, followed by a spray of 0·35% zineb 2–3 weeks later. *Studies on chemical materials* are also reported.

1006. SAANICHTON.
Summary Report Dominion Experimental Farm, Saanichton, B.C., 1956, 1957, pp. 15, illus., being *Publ.* **166**.

Work briefly reported on includes: *Tree and small fruits:* cultural and variety trials; sawdust mulching; breeding strawberries; commercial possibilities of growing dwarf apple trees. *Vegetables:* broccoli and tomato variety trials; cabbage spacing and breeding. *Chemical weed control:* in beetroot and strawberries. *Ornamentals:* chrysanthemum growing under shades to shorten daylength; chrysanthemum growing under plastic roof protection; chrysanthemum fertilizer trial; holly varieties; spraying holly cuttings with NAA to prevent leaf drop; holly fertilizer trials; iris nutrition and curing trials; plastic greenhouses and plant shelters. *Lawns:* grass varieties; moss control. *Equipment:* holly packaging machines; precision sprayer for experimental plots.

1007. SCOTTISH HORTICULTURAL RESEARCH INSTITUTE.
Fourth Annual Report, 1956-1957, Mylnefield, 1957, pp. 55.

Work in progress includes: *Pomology:* raspberry spacing, height of winter tipping, frequency of picking, training, time of planting, and breeding; black currant breeding; apple variety-rootstock trials; variety trials with top fruits and regional fruit trials; weed control in raspberries. *Vegetable culture:* variety trials with beans (french and broad), canning peas, brussels sprouts, cabbages, broccoli, carrots and spinach; breeding brassicas and beans; head development in cabbage. *Crop physiology:* the effect of photoperiod on strawberry plants, cold storage of strawberry runners, post-harvest defoliation, and changes in the free amino acid content of strawberry varieties. *Genetics:* spring chlorosis of strawberries; irradiation of brassica seed; interspecific *Ribes* crosses. *Plant pathology:* raspberry and strawberry viruses; tobacco mosaic in tomatoes. *Mycology:* host-parasite relationships in strawberry red-core; spore-trapping of *Botrytis cinerea*. *West of Scotland Unit* (*Auchincruive*)*:* strawberry breeding; mycological investigations on *Phytophthora fragariae*; June yellows. A description of the new strawberry variety "Red Gauntlet" and reports on variety trials with stringless french beans and brussels sprouts at Invergowrie are included.

1008. SEYCHELLES.
Annual Report of the Department of Agriculture for 1956, pp. 28.

Progress is reported on: the working of a pilot scheme for *Melittomma insulare* control in coconuts using paradichlorbenzene and felling; successful control of citrus black fly by the Eddy wasp (*Eretmocerus serius*); the partial control of rats by the Cape barn owl; the establishment of *Scolia ruficornis* as a promising parasite of the rhinoceros beetle; investigation of quality in cinnamon quills; establishment of vanilla in reafforestation areas.

1009. SHELL COMPANY OF VENEZUELA.
Servicio Shell para el Agricultor. Resumen de actividades, 1956. **(Shell Service for the Farmer. Summary of activities, 1956.)**
Compañía Shell de Venezuela, Cagua, Aragua, pp. 53, illus.

Work reported on includes: *Vegetables:* variety trials; propagation of onions from sets; weed control in onions; control of damping-off in onion seed beds with Arasan seed treatment plus captan or copper oxychloride soil treatment; control of *Cercospora capsici* on paprikas; control of aphids on cabbage with tetrethyl pyrophosphate; control of *Nezara viridula*, *Heliothis armigera*, *Faustinus apicalis* and *F. cubae* on tomatoes. *Sugar cane:* chemical weed control. *Tobacco:* nematode control with D-D. *Cacao:* control of *Monalonion dissimulatum* with chlorinated insecticides. *Coffee:* control of root mealy bugs. *Fruit:* control of *Tyl-*

enchus semipenetrans, *Gymnandrosoma aurantium*, aphids and *Phyllocoptruta oleivora* on citrus; weed control in citrus; pest control on soursop.

1010. Tomkins, R. G.
Fruit, vegetables and plant products division Ditton Laboratory and Covent Garden Laboratory.
Food Investigation 1956, H.M.S.O., Lond., 1957, pp. 43-52, 3s. 6d.

Work on *storage of apples and pears* concerned the following subjects: Conditions of storage, e.g. temperatures, use of film bags, mixing of varieties in store; effect of weather on superficial scald of apples; volatile emanations from apples; effect of cultural practice on storage; lenticel rotting of apples. *Biochemical work* concerns nitrogen metabolism; changes in organic acids in fruits; metabolism in apple tissue slices. Indications are afforded by *soft fruit storage* investigations of the most favourable conditions which can be achieved for the picking, handling and transport of various soft fruits. This embraces the use of pre-cooling, specially constructed containers, high CO_2 concentrations, crushed ice, etc. *Covent Garden Laboratory work* shows that the best storage temperature for tomatoes is 53° F. Deterioration of peas under different methods of vine handling is under investigation. Trials on the control of botrytis rot of grapes with griseofulvin are as yet inconclusive. A co-operative investigation on the efficiency or otherwise of present standard packing boxes for broccoli and packs for small fruit is in progress. Notes are given on progress achieved.

1011. Uganda Protectorate.
Annual Report of the Department of Agriculture for 1956, 1957, pp. 62, illus., Shs. 3.

Work on panama disease of bananas was continued. Sugar cane setts which had been given heat treatment against ratoon stunting yielded only slightly more than untreated setts. Perenox soil drench was successfully used against a damping-off disease (*Pseudomonas solanacearum* var. *asiaticum*) in tobacco seedbeds. Mg deficiency and secondary Fe chlorosis of coffee resulting from application of coffee husks or heavy grass mulching was proved to be associated with excessive accumulation of K in the soil. Very promising control of banana weevil was given by 0·1% BHC, 0·01% dieldrin emulsion and 0·0024% dieldrin w.p. Work by the Coffee Research Unit is reported on the breeding and cultivation of arabica and robusta coffee, control of coffee root mealybug, processing of robusta coffee, and on growth cycles, water relations and the propagation of robusta from cuttings.

1012. West of Scotland Agricultural College.
Report of the work of the College for the year ended 30th Sept. 1956, 1956, pp. 76.

The programme of work, briefly noted, includes the following items: Breeding tomatoes for resistance to leaf mould; economic aspects of sowing date and liquid feeding of tomatoes; ring culture of tomatoes; variety trials with chrysanthemums; national fruit trials at Auchincruive; weed control trials on asters and vegetables; the control of bracken; the use of maleic hydrazide for inhibiting the growth of apple fruit buds, cut flowers, yew hedges and grass; the control of *Pseudomonas marginalis* on dahlias; and a study on host composition in relation to disease attack.

1013. Western Canadian Society for Horticulture.
Report of Proceedings of the Thirteenth Annual Meeting of the Western Canadian Society for Horticulture, 1957, Regina, Saskatchewan, 1957, cyclostyled pp. 86.

This publication consists mainly of the reports of committees which are concerned with, among other things, apple rootstocks resistant to lime-induced chlorosis,* trials of species and varieties of fruits, vegetables, ornamentals and shelterbelts adapted to the conditions of the Prairie Provinces, the propagation of ornamentals,* and the use of herbicides.

New periodical.

1014. Indian Central Sugarcane Committee.
Indian Journal of Sugarcane Research and Development. [*Indian J. Sugarcane Res.*], 1957, Vol. **1**, No. 3, pp. 65, bibls, illus., Indian Central Sugarcane Committee, New Delhi, Rs. 5/– per annum or Rs. 1/8/0 per number.

From an examination of No. 3 of the first volume of this new quarterly journal it would seem that the intention is to provide a very thorough coverage of research work on sugar cane in India. Seven research papers are followed by short research notes describing the preliminary results of work in progress or summarizing results published elsewhere, and these in turn are followed by a general article on sugar cane development in India and by notes on items of interest. Apart from one paper on the chemistry of *gur*, the emphasis in this number is on cultural rather than on manufacturing aspects of sugar production. [For abstracts of individual papers see Section on sugar cane.]

Noted.

1015.

a Alberta.
Annual Report of the Department of Agriculture of the Province of Alberta for the year 1956, 1957, pp. 195, illus.
Including work at the Horticultural Station, Brooks.

b Brooklyn Botanic Garden.
Annual Report, 1956, 1957, pp. 34, illus.

c Cameroons Development Corporation.
Annual Report of the Cameroons Development Corporation for 1956, Bota, Victoria, pp. 33, illus.
Including fertilizer trials with plantation crops.

d Commercial Grower.
The Commercial Grower Handbook and Diary 1958.
Benn Bros., Fleet Street, London, 1957, 9×6 in., pp. 252, 12s. 6d.
For notes on the type of useful information given see *H.A.*, 25: 3387.

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* See separate abstracts.

e East Africa High Commission.
Annual Report East African Agriculture and Forestry Research Organization, 1956, pp. 114, Sh. 3/50.

f Hawaii.
Statistics of Hawaiian Agriculture 1956.
Agric. Econ. Rep. Hawaii. agric. Ext. Serv. **32**, 1957, pp. 58.
Including data on vegetables, fruits, coffee and macadamia nuts.

g Jamaica.
Annual Report of the Department of Agriculture, Jamaica, for the year ended 31st December, 1955, 1956, pp. 74, illus., 4s.

h Kenya.
Annual Report of Kenya Department of Agriculture, 1955. Vol. II. Record of Investigation, 1957, pp. 237, Sh. 7/50.
For a summary of these investigations see *H.A.*, 26: 4283; for later work see Abstr. 995.

i Lawalrée, A., and Webb, D. A.
Flore générale de Belgique. Spermatophytes. Vol. II, Fasc. 3. **(A general flora of Belgium. Spermatophytes. Vol. II, No. 3.)**
Minist. Agric., Jardin bot. État, Brux., 1957, 10×6½ in., pp. 287-490, illus.
For general information on the series see *H.A.*, 22: 3185.

j Long Ashton.
Annual Report of the Agricultural and Horticultural Research Station, Long Ashton for 1956, 1957, pp. 180.
See separate abstracts.

k Ministry of Agriculture, London.
Agricultural Statistics 1955-56. England and Wales. H.M.S.O. London, 1957, pp. 229, 10s.

l Mysore.
Report of the Administration of the Agriculture Department (Part II) for the year 1951-52, 1956, pp. 230.

m Mysore.
Annual Administration Report for 1953-54 (Part I) of the Department of Agriculture in Mysore State, 1956, pp. 163.

n N.A.A.S.
N.A.A.S. regional experiments in horticulture. Summary of experiments in progress, October, 1956-September, 1957, 1957, pp. 41.
Tabulated information.

o Nyasaland.
Annual Report of the Nyasaland Department of Agriculture for the year ended 31st December, 1956 (Part I), Zomba, 1957, pp. 36, 3s.

p Rhodesia.
Fifth Annual Report of the Sabi Valley Experiment Station—1955-56.
Rhod. agric. J., 1957, **54**: 337-63, illus.
Progress reported on growing sugar cane, bananas, pineapples, citrus and papaws.

q Singapore.
Annual Report of the Botanic Gardens Department for 1956, 1957, pp. 24, illus.
Including mention of coconut water to stimulate orchid seedling growth.

r South Australia.
Report of the Minister of Agriculture for the year ended 30th June, 1956, 1957, pp. 67, illus.
Brief notes on horticultural research pp. 16–17.

s Tanganyika.
Annual Report of the Government Chemist, Tanganyika, 1956, Dar es Salaam, 1957, pp. 13, Sh. 1/50.
Nutritional studies on wattle, coffee, cashew and pyrethrum.

t U.S. Department of Agriculture.
Report of the Secretary of Agriculture, 1956, 1957, pp. 60, 35s.

u U.S. Department of Agriculture.
Report of the State Agricultural Experiment Stations, 1956, 1957, **ARS-23-6**, pp. 14.
Tabulated data on organization, personnel, publications, etc.

v Washington State.
66th Annual Report of Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, for 1955-56, 1956, pp. 46, being *Bull.* **572**.
Projects and publications listed.

w Zürich-Oerlikon (Salzmann, R.).
Tätigkeitsbericht der eidg. landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1956. **(Annual report of the Zürich-Oerlikon Agricultural Research Station for 1956.)**
Landw. Jb. Schweiz., 1957, **6**: 303-71.